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CONTENTS.

The Mastery of the Air....237
Lake County Sanitary Association Organized....239
Color in Plumbing Fixtures....239
Roosevelt on Sewage-Disposal....240
Philadelphia Plumber Meets the Majesty of the Law..240
The Principles of Heating and Ventilating Public Buildings....241
The Plumber and the Press....244
Questions and Answers....245
Mr. Pierce Comments on Several Questions....245
Testing and Repairing Leaky Gas-Pipes....245
Air in Steam-Pipes....245
Points Necessary to be Clearly Defined in the Consideration of Sewage-Disposal Systems....246
A Combination System....246
No Disguise Necessary....246
Generalizing versus Specializing....246
The Ten Best Books....247
Practical Manual of Steam and Hot-Water Heating...248
The National District Heating Association....249
Eveleth, Wash., to Have a Plumbing Ordinance....249
The Journeyman and His Helper....250
"Domestic Engineering's" Cartoon on the "Dangers of Under-Estimating"....251
A Plumber's Diary....252
The Republic Mfg. Co. Leases Adjacent Building....253
The Celluvarno Co. Secures a Nice Contract....253
Lucius A. Cole, President of the National Lead Co., Dies at Carlsbad, Austria....253
Personal Mention....254
King's Pipe-Joint Compound....254
Six Little Pointers....254
The Zellweger Air-Washing and Cooling Fan....255
Foreman's Swinging Hose-Bracket....255
An Up-to-date Radiator and Boiler-Catalog....255
The Metal Market....256
Pig Iron More Active....256
Copper Market Stagnant....256
Tin Prices Advance Sharply....256
Contracts Awarded....256
Chicago North and Northwest Side Master Plumbers' Annual Picnic....257
Plumbers of Springfield, Mo., Hold Annual Outing....258
Austin and Oak Park Plumbers to Organize....258
Connecticut Plumbers' Executive Board Holds Important Meeting....258
Pacific Coast News....259
New England News....259
Business Ventures....259
Patents....260
Classified Advertisements.... 58
Index to Advertisers.... 60
"Domestic Engineering's" Buyers' Reference.... 62

THE MASTERY OF THE AIR.

The Newest Opportunity for Plumbers and Steam-Fitters.

Vacuum-Cleaning a Fresh Avenue of Commercial Endeavor.

The popular idea of mastery of the air is that of men flying through the air. The mastery of the air that concerns us is making air fly to our bidding.

Air is the only one of the four elements of the ancients that we cannot see. Fire, earth and water —these have been conquered by man and made to serve his necessities. Air is the last to yield and its conquest is even now being consummated. The most eminent commander of the victorious forces is General Cleaning.

Air offers a field of fascinating study. It has ceased to be recognized as an element in the strict sense of the word, and is known to be composed of four gases—oxygen, nitrogen, carbon dioxide, and argon. The last two, however, are found in such small quantities as to be negligible in our consideration of air.

Air is mankind's invisible attendant, performing most of its many and varied offices in silence and in secret. It is the universal purifier and life-sustainer. Man can live 5 weeks without food, 5 days without water, but not 5 minutes without air. Air exerts its beneficial influence owing to its remarkable constancy of elemental proportion. Its oxygen and nitrogen are always to be found in exactly the same proportions of an approximate ratio of 1 part of oxygen to 4 parts of nitrogen. This proportion is maintained everywhere under all conditions, whether in the courts of the metropolis, the breezy downs of the country, the arid deserts of Arizona, above the misnamed Pacific Ocean, in the polar regions, at balloon-heights, in the fever-camps of the Panama or the flower-gardens of the Californian Valleys.

Air is the chief medium of the joys we derive from light, heat and sound, but Nature provides it as such as part of the universal furnishings. It is the common birthright of peasant and prince. The trusts

dole out to us land by the acre, coal by the bucketfull, and water by gallon and electricity by the kilowatt, but **the air belongs to all without money, but not without price. The price of the air is our maintenance of its purity, for foul air means ill-health.** Hence our need of the mastery of the air. Hence the present crusade for effective ventilation.

The chief impurities in the air, that are known to be the causes of human disease and death, are found in the form of dust.

Dust—the source and end of man. Dust—the bane of the housekeeper. Dust—the enemy to sight. Dust—forming air-swamps full of germs, bacteria, microbes, bacilli—call them what you will—millions to the square inch, ever more numerous and prolific where men congregate and conditions become congested.

Our lives are spent in their greater part in our homes, our working-places and our offices. In towns and cities it is computed that four-fifths of their inhabitants spend four-fifths of their lives under roof and within walls. It is under such conditions that air is most easily and constantly defiled by dust, and therefore human health is most subject to attack and most readily impaired.

We stand on the threshold of control of air-purity. The air, with its burden of death in the form of dust, is being harnessed to remove it to the last germ. We are about to become an air-cleaning people, for air-cleaning by means of vacuum-production is now known to be a tried and tested process of scientific precision and procession.

Vacuum-cleaning and the installation of the necessary apparatus is the latest plumber's and steam-fitter's opportunity.

The word "Vacuum" comes from the Latin "Vacuus," which means "empty." We have kindred words from the same root, as "vacuous," "vacate," "vacation" and "vacant."

The principles of vacuum-production and utilization are easy to understand.

Our atmosphere or air is estimated to extend 50 miles above the surface of our earth.

Air has weight. Because of this weight, the bottom 5 miles of this 50-mile depth is estimated to have density equal to that of the other 45 miles above. Weight means pressure. The atmosphere in which we live exerts a universal pressure in every direction of 14.7 lb. per sq. in. at sea level.

Air has the property of expansion. Imagine a box, hermetically sealed. Remove one-fourth of the air within and still the box is filled with air, but the pressure is correspondingly less. Remove 75 per cent of the remainder of the air. Still the box is filled with air, but the pressure is lower. When all the air is removed, the box is empty of air—it is "Vacuus"—it contains a "Vacuum." **Vacuum therefore is zero pressure.**

Now open the cock through which the air was exhausted. Air is immediately forced into the box by the weight-pressure of the air above and around at a velocity proportionate to the extent and degree of the vacuum maintained. In other words, air is placed in motion.

The removal of dust by air-cleaning is therefore accomplished by the production of a vacuum, setting the air in motion which entrains the dust with it. The efficiency and range of this removal is in ratio to the extent of vacuum obtained and the proportions and designs of the apparatus containing and maintaining it.

The vacuum-producing apparatus consists in its permanently installed type, of pipe-connections from floor to floor, the vacuum-machine itself, the flexible hose and the cleaning tools.

The installations of this pipe belongs naturally to the plumber and the steam-fitter and already leading firms in the trade have realized this fresh opportunity for business and have completed important installations of air-cleaning machinery. This, however, is only the straw that shows which way the wind blows. The wind is yet to come.

Only a few years ago, cleaning by means of air was considered as a practice reserved for railroad and street-car service. The householder had not then been educated to its adaptability as a labor-saver in the home. Today every one who claims to keep generally in touch with domestic improvements will assert confidently that the vacuum cleaner is a labor-reducer and a health-producer. His education has been brought about by the popular magazines and trade journals and the expenditure of millions of dollars in advertising air-cleaning machinery of every type, good, bad and indifferent, but all educative.

Now, let us look the matter squarely in the face and see if we can truly label it—Opportunity.

The medical and sanitary leaders of thought have unanimously pronounced **dust** as a disease-breeder and conveyor.

The housewife has been taught to hate **dust** for generations. Hence the popularity of the broom and the brush and her use of them in warring on dust and dirt on exposed and accessible surfaces.

The present campaign of education, however, teaches the guardians of the household that when the housewife dusts the piano-top, although she cleans it from dust, she has defiled the air she and her children are breathing. In other words, she swallows the dirt in the form of dust for the appearance of general cleanliness. All women everywhere are now recognizing the axiom—**Dust in Motion means Danger, Disease and Death.**

The appliances for removing dust safely and effectively have been developed and perfected. There

need be no guess-work on the part of the plumber and steam-fitter as to whether any given machine will do the work that it is designed to perform or not.

The manufacturers of these appliances are realizing the important part that plumbers and steam-fitters will play in this as yet young but growing industry. In fact, the largest concern, manufacturing every type of vacuum-cleaning machinery, is devoting its specialized attention to advertising, its desire to do business with and through these trades particularly.

The air, which is the cleaning fluid, exists in the form of a vast deposit 50 miles thick and can be tapped at will anywhere without other cost than that of vacuum-producing power. It can never be exhausted. It is ever self-renewing. Gold and silver become peanuts and popcorn in comparison. Air can be tapped and piped without permit. You can be an air-miner **now.**

The public wants and will continue increasingly to want vacuum-cleaning. Builders, contractors and architects will meet this public demand and will install stationary vacuum-cleaning piping and machinery in all new buildings and will apply them to residences already existing.

Will the plumber or steam-fitter do the work? Or will they let Mr. Hardware Man do it?

You can readily realize that some one is going to do it. Those who have not yet made an investigation of the subject should do so now. Write to the manufacturers. Ask questions. Get plans and prices. On every job, go after this business.

The market is ready. The customers are waiting. The machinery is manufactured. Wanted—The men to do the work. Is not this your business opportunity?

LAKE COUNTY SANITARY ASSOCIATION ORGANIZED.

Master plumbers of Lake county, Ind., held a meeting last week at Gary, Ind., and formed an organization which will be known as the Lake County Sanitary Association. H. H. Highlands, of Gary, was elected president of the new organization, and the following committte on sanitation was appointed: C. H. Maloney, Gary; F. Erhardt, Indiana Harbor; James Clements, East Chicago; Wm. Kleihege, Hammond; H. H. Highlands, Gary, ex-officio. About 15 master plumbers were present at the meeting and took an active part in the discussion concerning the campaign, which they will wage in Indiana to secure sanitary legislation and to educate the people to the plane where they will support any move for such legislation which may be made. This campaign for education will be the first thing. The plumbers are against the use of Lake Michigan as a dumping ground for sewage. The plumbers are also advocates of state sanitary laws. Gary, Terre Haute and South Bend are the only cities in the state with adequate sanitary ordinances, it is said, and an effort will be made to extend the good work accomplished by these three cities. The plumbers, by passing a state sanitary law, will be able to force inspection of work by the state and examination of plumbers by an examining board.

COLOR IN PLUMBING FIXTURES.

By Henry D. McCormack, C. E.

We are so accustomed to think of plumbing fixtures as being snowy white, and the quality of whiteness has so long been associated in the mind with purity, that the very suggestion or even the thought of introducing color into plumbing fixtures comes with a suddenness that is startling and anything but pleasant. True, to a limited extent color was used in plumbing practice in days gone by, before marble-top lavatories were superseded by porcelain and porcelain-enameled fixtures. Then, pink Tennessee marble slabs and basin tops of onyx were not uncommon, and even the ordinary white Italian marble had blue veins running through the matrix. But those colors, such as they were, belonged inseparably to the materials of which the fixtures were made. They were not put on in the nature of decoration, nor to serve a utilitarian purpose.

Now, however, if we may judge by little signs, the time has about arrived when the householder will demand color in his plumbing fixtures, so they will harmonize with the general decorative scheme of the rooms in which they are installed. At first, of course, such an innovation will seem startling and we will have to adjust our thought to the new order of things. Once that adjustment has taken place we will welcome the innovation as an improvement. The writer well remembers the effect on his mind upon beholding for the first time a colored plumbing fixture. In a show-room in Pittsburg a pedestal lavatory enameled in a light, pretty shade of green was on exhibition. Pausing to examine the curiosity critically, he soon came to the conclusion it was a freak and fit only for a window display. But the picture of that fixture remained photographed in his memory, and some subtle influence kept drawing him back again to view the lavatory. Strange to say, to the second view it was not so freakish; to the third it was not without attraction, and by the time the fixture had been examined the sixth time, the mind had accustomed itself to the change, and the beauty of a bathroom fitted with tinted fixtures, and tiled with tinted tile, to match the fixtures, and form a background, stood out pleasantly in the imagination.

Why should fixtures and bathrooms be made all alike, and finished in one set color? If this is to continue the most interesting as well as useful room in the home to the housewife, why not inject enough variety into the decorations or finishings to lend variety to plumbing design and rob it of that dead monotony of which we will sooner or later tire? How much more attractive to the woman, who loves color and who inspects the bathrooms of her friends for new ideas, to have an unlimited variety of colors or tints, as well as designs, to select from. Such an innovation will catch and hold the fancies of women, and it is women who influence the sales of plumbing fixtures.

But are there not good reasons why fixtures and tiling in bathrooms should be white in preference to other colors? Do not sanitary reasons or hygienic reasons demand fixtures and tiling of snowy whiteness? On the contrary, no. The principal qualities, smooth glazed surfaces and imperviousness, are common to both kinds of fixtures, the white and the colored, while on the other hand, slight pleasing tints to fixtures and walls will prove restful to the eyes and remove that glare in a strong light which is so trying to weak eyes.

On the other hand, a little color in bathroom and fix-

tures would be welcome by the housewife for the reason that it will not show dust. Everybody who has had to do with white plumbing fixtures know how hard they are to keep clean. By keeping clean here is meant in the housekeeping sense, where the article which contains the least fleck of dust is dirty. During the warm months of summer when windows and doors are open to let in air, furniture and fixtures soon become covered with dust; and in houses in which ventilation is provided in connection with the heating, unless air-washers or filters are used, dust will likewise be passed into the house, to settle on furniture and fixtures. That dust must be constantly removed from snowy white fixtures or it will show and give the fixtures the appearance of being dirty; while if colored fixtures are used, the dust will not show so readily and they need be wiped only once a day. Dust, it might be objected, is dirt and unsanitary. Granted! But the housewife has other duties to perform and cannot be lying in wait with a cloth for each fleck of dust that settles; besides, fully as much dust settles on the furniture but on account of its color it is not visible. At all events, if the trade wants to kill the plumbing business, make the care of fixtures so burdensome that women do not want them; conversely if they want to improve plumbing conditions, make the labor light and the benefits great.

That women are alive to the necessity for color in fixtures is evidenced by the fact that so great has been the demand for something which will not show the moisture, or dirt, if you please, that the largest manufacturers of plumbing goods in the country were forced to put on the market a line of kitchen sinks of a light blue ,or robins' egg blue color. A white sink which is not perfectly dry looks unclean, and women soon found that each time water was drawn at the faucet, or anything was poured into the sink, it had to be wiped up, or against the snowy white background of the sink, it looked dirty. That is too much labor to entail for appearance-sake, and the women do not object to color in sinks. If you don't believe it ask them.

To go back to the ornamental feature of color, consider how beautifully slightly tinted lavatories could be made to harmonize with the background of walls in sleeping rooms, where they are installed. How much more attractive than a pure white fixture catching the eye and staring you out of countenance. Can you imagine anything more incongruous than a snowy white lavatory in a conservatory, where amidst the green foliage of the plants, it gleams like a set of teeth in a jack-o-lantern? How much more subdued and attractive would be a green tinted lavatory, harmonizing with the leaves and conspicuous to no one, not aware of its presence.

Color in plumbing fixtures is coming. In fact, it is on its way now, so try to accustom your mind to the change. Even though you do not approve of color yourself, you must yield your opinions to the public if they demand such a change. This you can easily find by talking with the women-folk.

How to Teach Swimming.

F. Hopkinson Smith, painter, author, engineer, and professional optimist, tells a story showing that Boston boys of the street are like all others. He overheard a conversation between two youngsters selling newspapers.

"Say, Harry, w'at's de best way to teach a girl how to swim?" asked the younger one.

"Dat's a cinch. First off you puts your left arm under her waist and you gently takes her left hand—"

"Come off; she's me sister."

"Aw, push her off de dock."

ROOSEVELT ON SEWAGE-DISPOSAL.

Theodore Roosevelt, speaking at Buffalo, N. Y., on Augst 25th spoke with his customary vigor on the sewage-disposal question. He said in part:

"Keep the fresh water-supply of the great lakes unpolluted. We claim to be civilized people, and civilized people ought to know how to dispose of the sewage in some other way than by putting it into the drinking water. We need action by both the state and the nation to put a complete stop to the pollution of the great lakes—action by the state so far as our own boundary is concerned and action by the nation because other states besides our own are interested.

"Our people must realize from now on that in addition to grasping after new fields of conquest they have to take good care of the things that have been conquered, that they have to attend to a number of things they have left unattended. Too much in the past it has been the habit of our country to let any man do what he wanted without regard to other men. We have got to that state when we must consider the interests of all. We have got to do more in such manner as to keep unpolluted the great lakes, the most wonderful body of fresh water in the country. We must do that in all matters pertaining to life, and in the matter of the improvement of the extraordinary heritage we have received, and in the field of morals, public and domestic.

"We must keep the water-supply unpolluted, and to do that you must see that it is not polluted in the source. In the same way we must keep the standard of public honesty and public decency high, and you cannot do that unless the individual citizen in the first place himself keeps it high."

PHILADELPHIA PLUMBER MEETS THE MAJESTY OF THE LAW.

Samuel McFarland, a plumber and steamfitter of 2226 Vine St., Philadelphia, had three serious encounters with the majesty of the law one day last week. In other words, he was arrested three times for carting a radiator from the mayor's residence to his shop by way of the new Parkway. Mounted Policeman Worrall made the arrest and charged Mr. McFarland with interfering with an officer. The accused told the Magistrate that he had been at the house of Mayor Reyburn fixing the radiators and that he was taking one away in a push-cart when the officer stopped him and told him he could not have a push-cart on the driveway. McFarland admitted he got angry and told the policeman he was an American, born here, and that things had come to a pretty pass when he was stopped going along what was to be a public highway. He got arrested, but friends in the Mayor's ward, the Fifteenth, had him released. He then started again with his push-cart and the radiator for Mayor Reyburn, but was again arrested and again released. The third time he was taken before Magistrate Scott in the Central Police Court..

The "accused" told his story and entered into a long statement of how long his forefathers had been in this country and asked what was to follow next when he was stopped on the highway. Magistrate Scott finally discharged him and told Officer Worrall and McFarland to shake hands and call it quits. They did shake hands and McFarland left the hearing room victorious for the third time, having won his right to push his cart along the new boulevard with the Mayor's radiator in it.

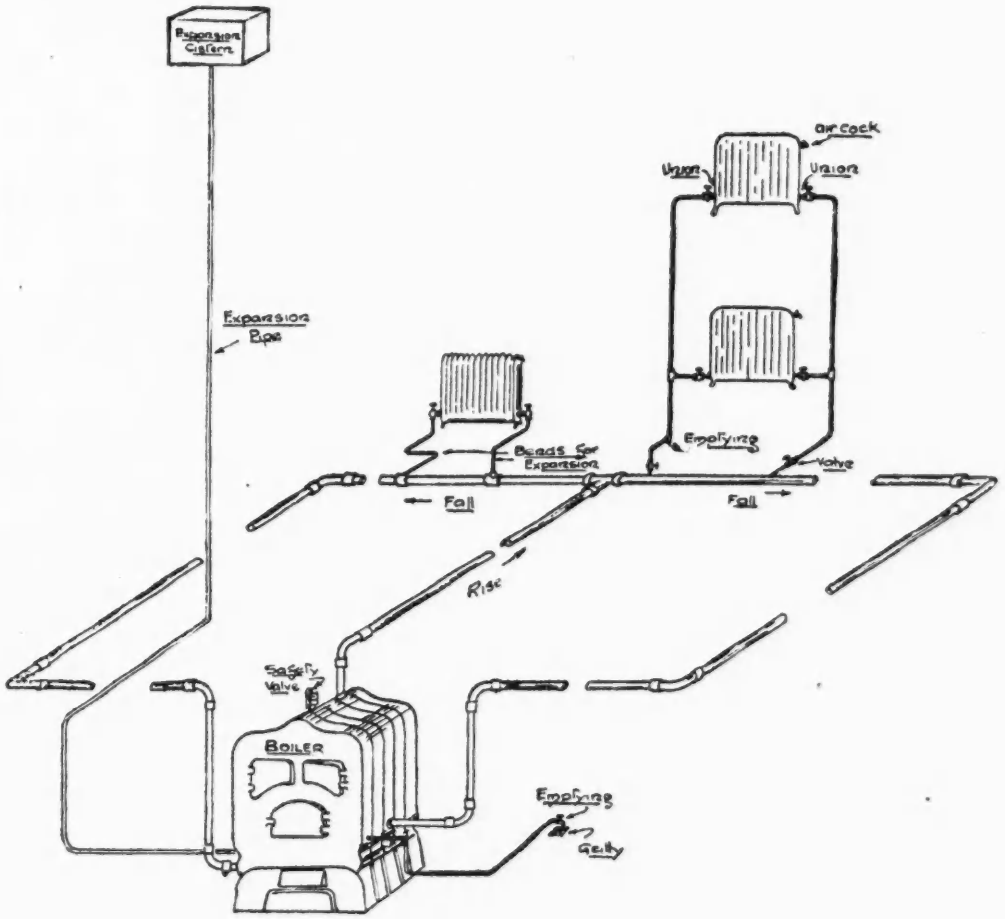
The Principles of Heating and Ventilating Public Buildings

By Alfred E. Wheeler.

* The Henry Saxon Snell 1909 Prize Essay. Published by courtesy of the Royal Institute of Sanitary Engineers of Great Britain.

Heat is transferred from hot bodies to the air by (a) conduction, (b) radiation, (c) convection. The exigencies of space prevent more than a mere passing reference to each of these principles, and it must here suffice to say that the effect of the first two in air-heating is so small as to be practically negligible.

The three most commonly employed heating agents are coal (or coke) fuel, gas, and electricity. For small and isolated units, in the absence of a public heat-supply, the latter two have much to recommend them, but their cost is prohibitive for any extensive use; the first-named is on this account practically in universal use. A com-



Low Pressure Hot Water Systems

The heat removed from a heated body by convection is proportional to the area of the heated surface, the temperature-difference between that of the surface and the surrounding air, and the velocity of the air passing over the heated surface, therefore in selecting the heating medium to be employed the determining factors are cost of the heating medium and facility of application.

parison of the costs of the three agents may be interesting as well as instructive.

Coal or Coke.—This fuel burned in a low-pressure steam or hot-water heating apparatus will give a thermal efficiency available for actual heating of at least 55 per cent. With coal at $4.86 per ton the cost of 3,440 B. t. u. is 0.0238 cents.

Gas.—In heating with gas, if the gas stove or radiator is unprovided with a chimney to carry away the products of combustion, we may fairly assume that the thermal efficiency of the stove is 100 per cent (disregarding for the present the fact that the waste products are discharged into the rooms to be inhaled by the occupants), and with gas at 75 cents per 1,000 cubic feet the cost of 3,440 B. t. u. is 0.095 cents.

Electricity.—Perhaps it will not be at once evident why the figure 3,440 B. t. u. was selected for comparison, but when it is explained that this figure is the heat equivalent of a Board of Trade electrical unit the reason becomes apparent. As electricity-supply companies invariably supply current for heating at a reduced rate as compared with lighting rates, we may take an average price for 3,440 B. t. u. at 2 cents, again allowing for 100 per cent thermal efficiency.

It will thus be seen that the cost of gas-heating is four times as great as that obtained from coke or coal fuel, and that of electric heating about 21 times greater than coal and 5.25 times greater than gas.

It is a very common but quite erroneous practice to regard the area of the heated surface necessary for heating as bearing some relation to the cubical contents of the room instead of its relation to the air supply, with the result that some buildings are inadequately heated, whilst in others the heat is too great. In considering the best methods to be adopted for heating public buildings it is necessary:—

1. To determine the hourly quantity of heat required to raise the temperature of the air plus the quantity of heat to replace heat losses through the walls, windows, etc.

2. To determine the best system by which to supply and distribute the necessary quantity of heat.

In an earlier passage it has been stated that the heat given off from heated surfaces is proportional to the difference of temperature between the surface and the surrounding air, therefore the total area of heated surface required is inversely proportional to its temperature. The average temperature of water in a hot-water heating apparatus is about 170 deg. F., and steam in a low pressure steam-heating apparatus 228 deg. F., or a temperature corresponding to a gage-pressure of 5 lb. per square inch, and these figures are usually not exceeded.

Strictly speaking the quantity of radiating surface to produce and maintain a given temperature should be computed on the merits of each case, but it is possible to give a rule sufficiently accurate for the surface temperatures given; and unlike nearly all such rules, besides being exceedingly simple, it has the merit of being based on scientific principles, and has further been confirmed by the results of experience extending over a number of years.

This rule is as follows: take the difference between the internal and external temperatures in degrees Fahrenheit and place a decimal point and two ciphers before it, multiply the cubic feet of air to be heated per hour by the figures thus obtained, and the result is the square feet of hot-water radiation required to heat the air. We have now to add sufficient radiating surface to counteract the cooling effect of external walls and windows. To do this add to the figure obtained as above 1 sq. ft. for each 24 sq. ft. of external wall surface and 1 sq. ft. for each 6 sq. ft. of window surface, the sum of these is the area in sq. ft. of hot-water radiation required.

For low-pressure steam radiation multiply the result obtained as above by 0.67.

Stated as a formula the above will be as follows:—

$R=(Cd)+\frac{W}{24}+\frac{G}{6}$ in which R=sq. ft. of radiating surface.

C=cu. ft. of air to be heated per hour.

W=area in sq. ft. external wall surface.

G=area in sq. ft. window surface.

d = a constant = $(t_i - t)$ .0001 where t_i = internal temperature deg. F. and t=external temperature. Steam heated radiator surface=0.67 R. This formula is sufficiently accurate for all systems except for the plenum system described later. As in that system the factor of the air velocity over the heated surfaces enters into the calculation, the rule cannot apply.

The amount of air which should be hourly allowed for public buildings is a subject upon which authorities differ very widely.

After a careful examination and comparison of many authorities the following allowances are here suggested per head per hour:—

	cu. ft.
Hospitals	2,000
Workshops and technical schools	2,000
Workhouses and barracks	1,500
Churches	1,000
Theaters and assembly rooms	1,000
Schools (adult)	1,000
Schools (children)	600

From these figures it will be readily seen that the quantity of heated surface required for heating buildings of different types will vary considerably.

The apparatus most commonly in use for heating by steam or hot water is cast-iron radiators or pipes in which is circulated hot water or steam as the heating medium.

Hot Water.—Hot water is a favorite system and gives little trouble, but on account of its comparatively low temperature a larger area of heated surface is necessary for a given output of heat than is required by a hotter medium, therefore considerations of space may militate against its use. The pressure due to head of water is sometimes undesirable in high buildings; and again in buildings where the use of the heating apparatus is intermittent, considerable risk is run of damage by frost.

On the other hand, a hot-water apparatus needs the minimum of attention, and its thermal efficiency is high, commonly reaching in a well-designed plant 60 per cent. Its first cost is, however, greater than that of most others, owing to the larger area of heated surfaces required and relatively large main pipes.

Steam.—To meet the objections to hot water, low-pressure steam is an alternative medium. For high buildings it is very suitable as, contrary to water, the pressure is unaffected by the height of the building. Where the apparatus is only in use intermittently it possesses undoubted advantages in that its pipes are empty when out of use and consequently not liable to damage by frost, while the heating effect when starting fires is very rapid.

Against the use of steam heat, however, an unaccountable prejudice seems to exist in this country, although it is very largely in use on the Continent and in America, and its advantages more than counterbalance its drawbacks, amongst which are the impossibility of heat regulation at the radiators, the valves of which must always be wide open or shut close. Also, when unskilfully designed, the system may be noisy. Again, from low-pressure steam air troubles are inseparable, large

tracts of the heating surfaces often being inoperative from this cause. All of these objections, however, may be eliminated by the use of vacuum pumps together with the special valves and appliances described later under the Atmospheric System.

Large buildings under one roof, having no requirements for steam other than heating or hot-water supplies, are best heated direct from a separate boiler. Under this description will come churches, schools, theatres, and assembly rooms. Technical schools usually have a steam plant for educational purposes; workhouses, barracks, and hospitals have a steam plant for cooking, laundry, and other purposes. Workshops and factories usually have one also for driving machinery. In all these cases hot water for heating is generated in a calorifier, and steam when used for heating, is supplied to the heating system at reduced pressure through a reducing valve.

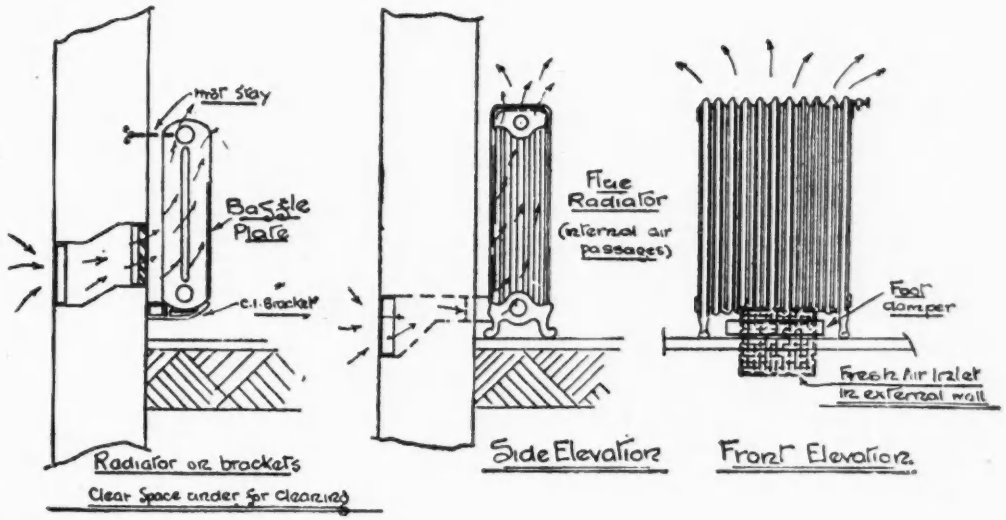
Boilers.—Boilers are constructed either of cast-iron, wrought-iron or steel. Cast-iron boilers are usually built up in sections, and have the advantage of being capable of enlargement by extra sections to accommodate any increase in the size of the apparatus. They are, however, liable to injury from the firing tools, and mechanical defects in the castings are not uncommon. They are much used on account of their low first cost, being cheaper for a given duty than a boiler of any other material, and they also represent the minimum of size for a maximum of power.

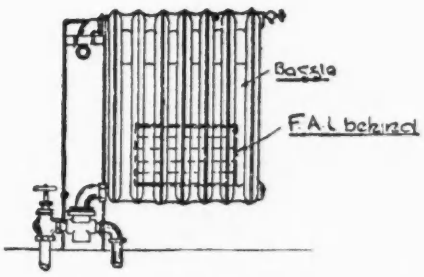
Small wrought-iron boilers are usually made of welded wrought-iron plates, and are either made for setting in brickwork or for use independently of a brickwork setting. All independent boilers, however, of whatever material constructed, should be covered after fixing with a good non-conducting composition at least 1½ in. in thickness, which increases the efficiency of the boiler and also results in a fuel saving.

Large wrought-iron or steel boilers are constructed of wrought iron or mild steel plates riveted together. These boilers are set in brickwork with flues so constructed that the hot gases traverse as nearly as possible the whole surface of the boiler on their way to the chimney.

Calorifiers.—These are usually constructed with an outer case enclosing pipes through which steam is allowed to circulate to heat the water contained in the outer case.

Types of Radiators with Fresh air Inlets





Small Radiator for Hospital Wards

In some calorifiers steam is allowed to intermingle with the water, but this practice has nothing to recommend it. The water of the condensed steam is constantly adding to the volume of water of the apparatus, and the condensed water exerts a corroding influence on the wrought-iron pipes of the apparatus.

Hot-Water Low-Pressure Gravity System.—This system is so called owing to its dependence for the motive power for circulation upon the unequal weight of two columns of water of different temperatures, and also to its being always open to the atmosphere rendering it impossible to generate excess of pressure in the apparatus. Radiators are located in the various apartments to be warmed, usually under the windows, and an inlet for the external air should always be arranged behind the radiator, so that all in-coming air may be warmed in its passage into the room. A radiator in this position likewise performs all the functions of a fan, and draws fresh air into the room.

(To be Continued.)

THE PLUMBER AND THE PRESS.

Scene—Any public school building of Chicago after the autumn opening Sept. 6.

Time—School days and hours.

Ensemble—First class in plumbing.

Teacher—Lulu, what is a lead pipe?

Lulu—A handy little hold-up tool; likewise a cinch.

Teacher—O, ah, exactly. Now, Margaret, how would a plumber thaw out a frozen faucet?

AFTER GIRL PUPILS IN THE PUBLIC SCHOOLS LEARN ALL ABOUT PLUMBING.

GREAT SCOT! THE PIPE'S BUSTED!
PIPE BUSTED! PIPE BUSTED!
WHERE ARE YOU GOING?
AFTER A PLUMBER! HE'LL SOAK US ABOUT $10.00 !
WHY—ER—I DUNNO—
WHY DIDN'T YOU TURN IT OFF?
SHE'S FIXING IT! YESSIR!—WITH A HAIRPIN! THERE'S TEN DOLLARS—
$10.00 PLEASE!
RALPH WILDER

Ralph Wilder in "The Chicago Record-Herald."

Margaret—Send in his bill. That would made things so hot the faucet would thaw itself.

Teacher—Excellent. Millie, what would you do if the bathtub became clogged?

Millie—Pull the plug, mam.

All of which is simply in forecast of what may follow an innovation announced for the approaching new school term by Supt. Ella Flagg Young. A little course in plumbing, she said, has been mapped out for girls as youthful as 11 years of age.

Pupils will be required to master such details as how the water and gas are distributed through mains to houses, then to kitchens, how connections are made, and similar things.—The Chicago Tribune.

MR. PIERCE COMMENTS ON SEVERAL QUESTIONS.

Editor "Domestic Engineering":—In the Aug. 20th number in "Questions and Answers," J. of Clyde, N. Y., asks in regard to piping for low cellars. This will be very fully explained in the coming numbers of the series of Practical Manual of Steam and Hot-Water Heating. A friend, "D. H. C.," of Des Moines, Ia., states a case of an overhead system where the "water left the glass," at 8 lb. pressure. He cured the trouble by putting in an "equalizer" at the boiler. "D. H. C." asks, if I consider it is ever necessary to use the "equalizers." To this I would answer. Yes, when the piping is incorrect, as in the case mentioned. If, however, the piping had been put in at first of correct size and had been dropped at all points far enough below the water-line of the boiler there would have been no call for the "equalizer." A careful study of the coming chapters of the "Manual" will fully explain all these seeming paradoxes.

M. M., of Omaha, Neb., writes a very interestinng letter on water-glass connections, but without the most complete data, covering every piece of pipe, every fitting, the exact sizes, pitch, the chimney draft, kind of fuel used, in fact a mass of data almost impossible to get, can the reasons for the condition, "M. M," describes, be explained, in so far as it applied to that particular case. The fact, however, is that hundreds of boilers with the water-glass connected to the boiler, as described by "M. M.," are working without one particle of trouble, at once establishes the fact that the case mentioned was caused by some influence outside of the water-glass connection itself.

The manner in which the trouble was corrected would indicate that probably there were two contributing causes. The first possibly being that all the delivery openings on the boiler were not connected full size, or, that the return pipe was connected to the wrong side of the boiler. The second cause would probably be partially aided by the piping and the fittings, even if all the openings from the boiler were used full size. The change in connection described, indicates that the boiler was making steam very rapidly, the velocity became so great and the volume of such quantity that the steam, plus the water head in the drop-pipe, sought the point of least resistance, which would be the connecting nipple with the section having the water-glass connection, as this pressure must of necessity be greater than the pressure in the body of the boiler the water in the boiler would be prevented from entering the bottom gage-glass connection, with the resulting uncertainty as to where the water in the boiler actually stood. By changing the bottom connection to a point high up near the top of the water in the boiler and where the steam pressure in the boiler was a trifle more than at the same level in the drop pipe, a steady water line would result.

If "M. M." will carefully study and absorb the various sections on pipe-sizing in the series of the "Practical Manual," he will come to clearly understand what caused the trouble described in his letter. When the selection of boilers is reached in the series, conditions will be described that will serve, in connection with the discussion on pipe and fittings, to enable any one to so lay out their work, that troubles, such as these mentioned, need never occur.

I am much pleased Mr. Editor, to see these letters from such widely separated points, showing an interest in the work, and while it is impossible to fully answer each one now, I can say to each that the coming installments will completely clear up each question, if not specifically, yet in a way that will make a specific answer unnecessary.

Belfast, Me. E. R. Pierce.

TESTING AND REPAIRING LEAKY GAS PIPES.

Editor "Domestic Engineering":—About how long a test, how much pressure and what kind of pipe would you advise to put in a first-class gas job? If any leaks show up, would you advise the use of dope of any kind to make them stop? Trusting to hear from this, I remain,

Mobile, Ala. Gas Piping.

We should apply from 15-in. to 20-in. pressure and keep it on anywhere from 30 minutes to one hour. If the temperature of the atmosphere is even during the test you should be able to get nearly an accurate test by so doing. If you use all piping smaller than one-half inch galvanized pipe and galvanized fittings as well, you will have removed many chances for running up against leaks. Just because a fitting happens to have a sandhole or two is no cause why it should be removed, provided you can caulk the sandhole. Go to it with a cold chisel and see what you do to it. If this is not successful, it would be safer to remove the fitting rather than to depend upon dope, much of which is uncertain. It is best to so fix these pipes that there will be no doubt of leaks when the pipes are covered up from sight. With some workmen the main point is to get the pipes out of sight, no matter in what condition they are. If the job is worth doing at all, it is worth doing in a creditable and a workmanlike manner, and in such shape that it will bring good returns later on.

AIR IN STEAM-PIPES.

Editor "Domestic Engineering":—Will the air-valves, as they are generally put on to the steam mains, always remove the air from the system as it is expected that they should? An answer to this will greatly oblige,

One of Your Readers.

We find, on looking into this matter, that one very prominent authority upon the subject states that the air-valves, as many times installed on the main, do not fully accomplish the purpose for which they were put on. This authority states that in large pipes, when the steam is turned on, it will circulate along the top of the pipe and that the cold air remains at the bottom of the pipe. He states that such a condition can be remedied by running the air-pipes on the mains down to the bottom of the main, so that the air is removed from the bottom instead of the top, and that the air-valves should be installed on the larger jobs at distances of not more than 100 ft. The air-valves should be placed at the high points

on the return mains and most particularly at places where the return main rises, passes along the horizontal and then drops down again. At these places the air-valve should be located at the top of the main, and if this is not done, the air will accumulate at these high points and tend to prevent the passage of water. Therefore, listen to the words of this authority and take heed accordingly.

POINTS NECESSARY TO BE CLEARLY DEFINED IN THE CONSIDERATION OF SEWAGE-DISPOSAL SYSTEMS.

We receive frequent letters concerning sewage-disposal systems but the inquiries are of such a vague character that it is impossible for us to advise the inquirers correctly. The following points essential for the intelligent consideration of any one proposition are set forth in the literature of the Russell Sewage Disposal Co., Burlington, Ia., and are applicable to all systems. We reproduce these believing that they will enable our correspondents to present their propositions so that they may receive prompt and satisfactory replies to their queries.

Make as clear a report as you can as to location of grounds and buildings.

For Town—Give population .....
Residence .....
Summer Home .....
Hotel .....
Boarding House .....
No. of months used.....
Average number of persons living in building.....
No. of rooms in the house.....
Name of plumber doing the work.....
Plumbing Fixtures:
.....Bath tubs.
.....Water closets.
.....Lavatories
.....Kitchen sinks.
.....Laundry tubs in basement.
How deep from top of ground is the cellar floor.....
Have you a cellar drain?.....
What distance from the house does it empty?.....
What direction does the house front?.....
Which way does the ground slope?.....
How much fall from house to end of lot?.....
Is there a street drain or slough to run the clear water in? .....
What is the first three feet of soil?.....
What is the soil six feet down?.....
How deep does the ground freeze?.....
Do you have city water?.....
Pneumatic Tank? .....
Garret Tank? .....
How deep to sandy soil?.....
Draw a diagram of the lot, showing location of all buildings, wells and cesspools.
Mark North, East, South and West, also street location.

A COMBINATION SYSTEM.

Editor "Domestic Engineering":—Can you tell me if there is anything such as a combined steam and hot-water heating system? Seems to me that I have somewhere seen something about such systems, but I would like to know for sure. I. M.

There are several systems that use a combination of hot-water and exhaust steam. As described the exhaust from the engine is passed through an exhaust heater and the water, heated in this heater, is circulated through the heating system by pumping it through. One may readily see that by using an apparatus of this kind a large amount of territory can be heated. It is stated that, owing to the fact that the circulation is obtained by using pumps, smaller mains can be used than could be used for either exhaust steam or low-pressure steam. To get an idea of the size of some of these jobs it may be mentioned that some of them have something like 1,000 houses hitched to one central heating system.

NO DISGUISE NECESSARY.

Editor "Domestic Engineering":—About 10 years ago I had made a new tool-bag from that ancient trade favorite, a Brussels carpet. Being on jobbing or repair work, I believe it was the first job I landed on announcing my arrival by door-bell. After some delay a boy opened the door partly and said, Mamma, did not want to buy any rugs. Explanations were necessary but I took the tool-bag home and dyed it black that evening.

About three years ago I went to a house to hang gas-fixtures. The assembled fixtures I had bundled on my shoulder and I did not realize I looked like a Jew peddlar until a girl came to the back door stating that they did not wish to buy anything.

I asked the girl if she would not leave me hang the fixtures and that she might change her mind. She tumbled on gradually and steered clear of me, being confused by her mistake.

But the worst deal I ever got was about two months ago while walking along a street with my employer I had my tools hanging from my shoulder and was carrying a bunch of Reznor hooks hanging to my fingers loosely. A near-sighted man hailed me after passing and asked me if I mended umbrellas.

These incidents happened in three different localities and I am sore now on the ancient carpet-bag.

New Brighton, Pa. Marion.

GENERALIZING VERSUS SPECIALIZING.

Editor "Domestic Engineering": I wish to bring up the subject of Generalizing versus Specializing, my viewpoint being that a shop which employs all-round mechanics has steadier employment, for those men, than a shop which has a plumber, a gasfitter and a steamfitter for work in those respective branches. Gasfitting is hardly a trade, and a man limiting himself to that makes a mistake as well as does an employer in not seeing to it that a complete general mechanic is always turned out by his shop. This indifference has created the specializing by employes to the extent of having in large cities three and sometimes four separate unions, which base their working rules on the principle of specializing. The employers find they are then up against a condition for which they are primarily to blame. A customer calls, gives orders for repair to boiler, plumbing and gas fixtures. This means three mechanics, where one might do, or where three general mechanics would be better in getting through with a job.

Steamfitting when mastered, or I should say heating, is a science which a tinner or hardware dealer cannot butt into so easily as they do into plumbing and gasfitting. The trouble with the steam and hot-water heating trade is that that branch is more in demand in large cities which permit a man to become a thorough and practical steamfitter. In small localities there is not enough work in the heating line for a man to become

thoroughly experienced, and this lack can be made up by study. In many cities where the trade is specialized such specialists are not capable to accept employment in a shop located in a smaller town because he has not the experience, confidence and ability of a general mechanic. It's too much like that nation of specialists in India, where they have one man to swing the fan, another to tickle your feet, another to scratch your head, another to pick your teeth. It's caste there, but something else here.

Now there is not the work that there used to be in plumbing and its allied branches. There is more of it done and done better than formerly in most localities, which reduces repair work to the lowest possible point. Plumbing cannot be much of a trade when a tinner or hardware dealer is permitted to employ a mechanic simply because the building contractors get sore at practical men in business and desire to create competition by encouraging skates to undermine men who have served their apprenticeship at the trade. A practical man, however particular he may be, can get along better with his mechanics than a man who has butted into the business with pencil, pad and bank account.

You take most of these misnamed master plumbers, the unpractical men, and they have not had experience enough to know whether a man is soldiering on a job or not, but on general principles figure or imagine that work ought to be done sooner. While a floater might enlighten them forcibly, the poor home guard who is too scared to seek work elsewhere, stands for that gaff from these greenhorns that are putting the trade on the bum in many localities where plumbing regulations are lacking. There is one condition common in every locality—that is, the men you can't pry loose with a crowbar from a shop, even with the smallest amount of work in prospect and an opportunity elsewhere for employment until work picked up with their regular employer. They will hang around and catch the crumbs thrown their way. I have come across some employers who get sore because a journeyman will pack up his tools and get work elsewhere in preference to waiting for something to turn up. That's something no one can afford to do unless circumstances compel such patience, which drives impatient men crazy by loss of time and money. But the worst of it all is how mechanics will hurt their own living by educating a tinner, pipeliner or hardware dealer to a working knowledge of his trade.

Such amateurs, running amuck amongst the trade, have injured practical men in business as well as knocked mechanics in other shops out of employment. I believe the trade would be better off by requiring a man to have practical experience before permitting him to engage in business; by supply houses selling only to practical men and mechanics being allowed only to enter employ of practical employers. This would be impracticable to the plumbers, but not impracticable with the brickmasons. But plumbing can't be much of a self-respecting trade when any sort of an amateur can butt into it, and a mechanic working under such conditions has no respect for his trade if he serves as instructor to those dodging apprenticeship.

In fact, the plumbing trade can't be much of a trade when any unqualified person can butt into it.

This condition of affairs cannot last long, a change must come, and after that it will be either the mechanic or a handy man, but the mechanic who studies thoroughly all branches of the trade and becomes familiar with all specialties will not be a loser in this period of evolution, because combinations and trade publications are life preservers to practical men. Dull conditions of trade make many men indifferent when they should be throwing ballast overboard. Instead of realizing the action necessary they unconsciously become chloroformed into a rut. I know of plumbing shops carrying stoves 4 or 5 years, as well as gas fixtures. What profit is there in carrying stock in competition with hardware stores and furniture stores? Why should plumbers load up on material that it will take two or three years to dispose of? Money on interest would pay better.

Salesmen or drummers don't care what they unload on a plumber just so they are sure he will pay regardless of how it will affect his working capital or cash account. Too many plumbers are put into bankruptcy by the persuasive drummer unloading onto him more goods than is necessary for a season's work. Goods in stock for a year are a dead loss, even junk ought to be disposed of in that time in order to keep the shop presentable and allow working room.

New Brighton, Pa. Marion.

Thanks! But Don't Be So Shy.

The editor of "Domestic Engineering" herewith thanks the correspondent from New Brighton for his most interesting letters. One of them adds to the gaiety of nations and the other is an interesting sidelight on generalization versus specialization. Human letters like these always make good reading for they are "talks" not efforts at oratorical display. We would be pleased if our New Brighton friend would overcome his diffidence and attach his address to his next letter. We want to know where all the good folks live. It is because they are so modest that the world thinks they are scarce.

THE TEN BEST BOOKS.

Editor "Domestic Engineering":—In your recent issue a gentleman from Cincinnati requests a list of the best ten books for plumbers and steam-fitters. I append herewith those that I consider fill the bill in my own reading experience, excluding the excellent works issued by the Scranton Text-Book Co.

Plumbing Books.

Plumbing Catechism. By C. B. Ball. Roughing-in House-Drains. By John K. Allen. Swimming Pools. By John K. Allen. The Sanitary Sewerage of Buildings. By Thos. S. Ainge. Sanitation in the Modern Home. By John K. Allen. Principles and Practice of Plumbing. By J. J. Cosgrove. Sewage Purification and Disposal. By J. J. Cosgrove. Wrought-Pipe Drainage-Systems. By J. J. Cosgrove. Modern Plumbing. By R. M. Starbuck. Plumbing Plans and Specifications. By J. J. Cosgrove.

Heating Books.

House-heating. By C. B. Thompson. Notes on Heating and Ventilating. By John R. Allen. Heating and Ventilating Buildings. By R. C. Carpenter. Heating. By Baldwin. Heating. By Chas. L. Hubbard. Johnson's Manual. School-House Heating. By John Moore. Steam. By Kent. Domestic Engineering's Heating Articles, saved from each issue and bound in book form.

Little Rock, Ark. A. J. Purcell.

Census-taker—How many children have you?
Citizen—Three.
Census-taker—Altogether?
Citizen—No; one at a time. —Life.

A PRACTICAL MANUAL OF STEAM & HOT-WATER HEATING

BY EDWARD RICHMOND PIERCE

SECTION XVIII.

The discussion on pipe sizes for two-pipe work and single-pipe work applies also to all types of steam-work. An overhead steam-job is sized for velocity the same as any other. There is only one unfailing, never-to-be-forgotten rule connected with overhead work that if overlooked will usually cause the water to leave the boiler, viz.: No drop-pipe must be stopped until it is below the water-line level of boiler.

A secondary circuit can be run half way between top supply and boiler or one can be run on several floors if all drop-pipes are carried to basement and enter main return pipe **below the water-level of boiler**.

Probably the overhead-system is the peer of all heating-systems where conditions permit or compel its use.

If the cellar is so low that a circuit cannot be completed and secure a steady water-line, then the overhead system is all valuable, providing always that every drop-pipe is carried below the water-line of boiler. If there is one single pipe that the fitter fails to get into this wet return below water-level, trouble will probably develop for him all right, and will continue until the piping is fixed so that the lower end of that drop-pipe is below the water level of the boiler.

The table is computed for straightpipes with water-level in returns 6 ins. above that in boiler. For other resistances and steam-pressures, multiply the diameters as given above by following factors:

Water-level in return above boiler..	2 in.	12 in.	18 in.
Multiply by.....	1.25	0.88	0.80
Steam-pressure above atmosphere.	0.5 lb.	2 lb.	5 lb.
Multiply by.....	1.22	1.16	1.09

It will no longer answer to take anybody's table for pipe-sizes and put the pipe in any old way.

Recently there have been some very strenuous advocates of small pipe in steam-work. I have no bone to pick with them. They are all right from their point of view and with their knowledge behind their point of view. But with a limit of 2-lb. pressure and almost no knowledge on the part of the trade of velocities and volume, the members of the trade at large had better stick to the slow velocity and larger pipe.

There are, however, one or two matters in regard to the old practice which, under the new demands upon steam fitters, require suggestion at least.

The most important is the habit of steam-fitters in both steam and hot-water piping of using reducing tees and elbows. A tee, as we have seen, reduces the pressure by friction the equivalent of 60 diameters of pipe on a straight run. To add to this the friction of a smaller pipe at the very point where a lot of strength is needed anyhow, is doubtful assistance. It would probably be vastly better to continue the full size of pipe beyond the tee connection some distance, and use a reducing coupling and thereby get nearly full value of whatever strength or pressure was left on the steam or water.

Another is the habit of using ordinary fittings for connections on hot-water jobs. The hot-water job usually requires all the assistance it can get to aid the speed of circulation, and all the power that is exhausted in overcoming friction certainly can not be regenerated and used to promote circu-

TABLE Z.

Internal Diameters of Steam-Mains for a Single-Pipe System of Heating by Direct Radiation.
Steam pressure 10 lb. above atmosphere, frictional resistance 6 in. of water-column.
Steam pressure 0.5 lb. above atmosphere, frictional resistance 12 in. of water-column.

	Length of Steam-Main in Feet.								
Radiating Surface Sq. Ft.	20	40	80	100	200	300	400	600	1,000
	Diameter of Pipe in Inches.								
20	0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.9	1.2
40	0.6	0.7	0.8	0.8	1.0	1.0	1.1	1.2	1.6
60	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.8
80	0.8	0.9	1.0	1.1	1.2	1.4	1.5	1.6	2.1
100	0.9	1.0	1.2	1.2	1.4	1.5	1.6	1.7	2.3
200	1.1	1.3	1.5	1.6	1.8	1.9	2.0	2.2	2.9
300	1.3	1.5	1.8	1.8	2.1	2.3	2.4	2.6	3.5
400	1.5	1.7	2.0	2.0	2.4	2.6	2.7	3.0	4.0
500	1.6	1.9	2.2	2.2	2.6	2.8	3.0	3.2	4.2
600	1.8	2.0	2.4	2.5	2.8	3.0	3.2	3.5	4.5
800	2.0	2.3	2.6	2.7	3.2	3.4	3.6	3.9	5.0
1,000	2.2	2.5	2.9	3.0	3.4	3.7	3.9	4.3	5.5
1,400	2.5	2.8	3.3	3.4	3.9	4.2	4.5	4.9	6.5
1,800	2.7	3.2	3.6	3.8	4.4	4.7	5.0	5.4	7.0
2,000	2.9	3.3	3.8	3.9	4.5	4.9	5.2	5.6	7.2
3,000	3.4	3.9	4.4	4.6	5.3	5.8	6.1	6.6	8.5
4,000	3.8	4.3	5.0	5.2	6.0	6.5	6.8	7.5	9.7
6,000	4.1	4.7	5.4	5.7	6.5	7.1	7.4	8.2	10.5
8,000	4.4	5.0	5.8	6.0	7.0	7.5	7.9	8.7	11.3
10,000	4.7	5.3	6.1	6.4	7.4	8.0	8.4	9.2	11.9

It is not necessary for the purposes of this book to go into minute details of description of pipe-fitting. That is every-day practice for those who are in the business.

In section XVII we gave Mr. Wolff's table for two pipe work. Table Z gives the sizes calculated by Prof. Carpenter, for single pipe work, as shown in his book, "Heating and Ventilating Buildings."

The above table Z is computed by formulas for diameter in inches in which head=318.6 (of water); quantity of steam discharged per minute=9.2 cu. ft. for 100 sq. ft. radiating surface.

lation. Common sense, applied to piping connections, would have saved many a job from unsatisfactory performance. Leaving the full discussion of piping methods to be taken up later, we are now ready to select a boiler for our steam-job.

We are able to determine how many B. t. u. must be furnished per hour. The boilers are all rated on a basis of 2-lb. pressure at boiler.

Suppose we have found we require 500 ft. of radiation in the rooms. Should we put in a boiler rated for 500 ft.?

Most assuredly not. Why? In the first place, the piping, covered or uncovered, will use up as large a quantity of B. t. u. that the boiler will produce, and so, of course, those do not get to the radiator at all. At the very best estimate this demand will equal one-quarter of the boiler capacity at 2-lb. pressure. The piping often exceeds on small jobs, in radiating surface and heat-loss from friction full 40 per cent of direct radiating surface. Carefully measure up all piping, risers, radiator-valves and all surface connected to any job you ever did with 500 ft. or less direct radiation and add to this the loss by reason of friction and see if the statement that 25 per cent is the very smallest that can be allowed for piping as draft on boilers at 2-lb. pressure is not very conservative.

It was different when 15 to 60-lb. at boiler was in vogue. Now, we are dealing with a proposition mighty close to hot-water conditions and friction eats up a big percentage of our available B. t. u.

Then there is the difference in fuel from year to year to be considered; the probability that it will sometimes be colder than just zero, in which case more heat will be demanded; then again, while the boiler is rated to carry a certain number of feet at 2-lb. pressure, how long at a time will it carry it? Look catalogs over and see how many make this apparent.

These boilers may be rated, for all you know, on a 6-hour firing basis, or more or less, or perhaps a careful measuring up and testing of boiler would show an 8 or even 9-hour carrying capacity for 500 sq. ft. at 2-lb. pressure. Assume first an 8-hour basis. Then if your client fixes his fire at 9 p. m., he must be up at 5 a. m. next day to attend to it, if the steam is to be supplied at the time most needed. Will he do it? Hardly. It is more likely to be 7 a. m. the next morning. If so, then two hours or 25 per cent of the rated value of the boiler has been demanded by the radiators, when there was no garantee on the part of the manufacturer to supply it. The item of extra demand from piping being 25 per cent and the almost certain demand from owner of a longer supply than 8 hours, equaling, usually, at least 10 hours or 25 per cent more demonstrates the necessity of an arbitrary increase in boiler-capacity over stated amount of radiation required on job of at least 50 per cent. A job requiring 500 sq. ft. of steam-radiators figured on 2-lb. pressure basis should have at least a boiler rated at 750 sq. ft. capacity.

As will be seen, this is not because the boiler is incorrectly rated but for reasons entirely outside of the special item of radiators in the rooms.

Many men want their boilers so that they can hold fire 12 hours at pressure-producing point. That is 50 per cent of itself beyond the rated capacity of boiler under selected conditions of 8-hour run and 100 per cent beyond the rated capacity of a boiler rated on a 6-hour firing basis. **In both cases the additional tax from piping and friction must still be added.**

The steam-fitter should inquire into the desires of his client as to length of time between firing dates and figure accordingly. Then he must know from the manufacturer just the number of hours the boiler he intends to use will supply steam at 2-lb. pressure and have sufficient fuel left in good condition to start a fresh lot of fuel without materially diminishing the steam pressure.

With this information he can select a boiler with a reasonable sense of security.

Boiler manufacturers are now selling their product on the practical basis of an average temperature in the radiators, with steam at 212 deg. or less. The 2-lb. pressure is a factor of safety against all sorts of possible mistakes on the part of party installing the boiler.

It is up to the steam-fitter to meet the present conditions by having a clear understanding of the fundamental principles governing the medium he is attempting to harness and control, viz., steam.

(To be Continued.)

THE NATIONAL DISTRICT HEATING ASSOCIATION.

D. L. Gaskill, Greenville, O., secretary-treasurer of the National District Heating Association, reports that the committee on revision of the constitution of this organization is preparing several drafts and will meet for conference and preparation of final drafts in the city of Pittsburg at the time of the meeting of the executive committee which will be held in that city sometime early in December. The executive committee, which consists of the president and secretary, three vice-presidents, and Mr. A. C. Rogers, of Toledo, Ohio, and Mr. E. J. Keifer, of Easton, Pa., will meet early in December for the purpose of fixing the time and place and deciding upon the program for the 3rd annual convention of the association. The exact date of the meeting of the committee has not yet been fixed. Since the second annual convention, held in June, the following applications for membership have been received and approved:—Merchants Light, Heat & Power Co., San Francisco, Cal.; Tuscarawas County Electric Light, Heat & Power Co., New Philadelphia, O.; Harrisburg Steam Heat & Power Co., Harrisburg, Pa.; Evans, Almirall & Co., Chicago; Otto E. Osthoff, Chicago; York Steam Heating Co., York, Pa.; Ernst Schielevy, Hamburg, Germany; McGraw Publishing Co., New York, N. Y. The printed proceedings of the 2nd annual convention, bound in cloth form, are now ready for distribution and are sent to all old members and all new members that apply for membership. Owing to the limited edition they are not for sale and are sent only to those who carry a membership or apply for same. The distribution began September 1st.

EVELETH, WASH., TO HAVE PLUMBING ORDINANCE.

Eveleth, Wash., is to have a plumbing ordinance which will cover everything from the laying of a maximum size sewer-pipe to the smallest washer on a water-faucet. Some of its citizens have made complaint that the plumbing rates are excessive, and the work done is of the lowest class.

At the last meeting of the city council Health Commissioner E. M. Gans discussed the plumbing work that is being done by local plumbers. Some of the work, he said, is very unsanitary, and the public health demands that a set of rules be drafted for the doing of plumbing jobs in general. He also advised the council that in order that future plumbing might stand health and sanitary inspection a plumbing inspector should be appointed. The council was favorably impressed by the suggestion, and an investigation into existing plumbing and health conditions will be made. There are three local firms engaged in the plumbing business in Eveleth.

He—May I have the pleasure of this dance with you?
She—Certainly, but it must be very slow, as I have just gone into mourning.

THE JOURNEYMAN AND HIS HELPER

JOIN HANDS FOR BETTER WORK

We have been greatly pleased with the success of the department upon "Business Management" which we started in the early part of the year. From various sources and at different times there have come requests to us asking that we establish some kind of a department especially for the man who is on the job all the time and who has to do the work, viz., the journeyman. We have thought this matter over and decided to give it a try-out, under the same conditions that we started the "Business Management." If the department creates enough interest we will continue it. If not, it will be cut out after a thorough trial has convinced us that it will not succeed. So it is, to a certain degree, up to the readers interested to not be too backward about coming forward.

After giving the matter sufficient thought we decided that there was another party directly interested in the game and so we shall run various articles which will interest and assist the helper of the journeyman. The two will be combined under the above heading and we hope to see some very interesting matters appear from time to time. We are going to start this department and run it every other week, alternating it with the "Business Management" department, for a while, anyway. The "Questions and Answers" will be published every week as heretofore. There are hundreds of things happening in the craft that never see the light. Many first-class short cuts to doing work. Many good stories. The real heart and life of the craft has never been shown fully as yet. Mr. "Phoenix" has done some very effective work along this line and we hope that others may take his example to heart and come across with the goods. Therefore it is with great pleasure that we present the first issue of the new department.

TOO MUCH IS ENOUGH.

Some weeks since we had occasion to look up certain matters and the course of our investigation took us through several years of the different trade papers relative to our crafts. We were surprised to notice how much there was about the mechanical and how little in regard to the mental and business part of it. It appeared to us that the poor fitter and plumber has been literally piped to death. Range-boilers, waterbacks, pipes and fittings all appeared in greatest profusion, but the supply of articles or thoughts that would tend to lead any one to become a better man or to enlarge his brain-power were darned scattering.

We believe that fully 50 per cent of the master plumbers of the country today were, at one time, journeymen. So when we make any suggestions we are speaking to an audience of several thousand future master plumbers. Therefore if we can get in a few good thoughts or ideas that will lead people to seek to improve themselves we shall have done something to raise the standard of the business and the craft in the next generation. Before a man assumes obligations he should be prepared, and before a journeyman lays down the tools and takes upon himself the responsibilities of the master, he should have acquired more knowledge and of an entirely different character than that which he possessed as a mechanic.

Looks reasonable, doesn't it? You wouldn't assume to butt into the jeweler's business, for instance, and expect to make a howling success of it from the very start, would you? Yet you try comparatively the same act when you assume to run a plumbing business by merely jumping over the fence. The plumber and the fitter has had his head crammed full of pipes for the past 25 years and we fail to see that there has been any great amount of improvement in the workmanship in the jobs. Perhaps the men do not read the papers; what we think is that the men should have suggestions along different lines of a nature that would cause them to reflect upon other aspects of the business and the craft than merely the pipes and the fittings of which the best only should be presented. Let us hear from you in response to these few remarks. We shall be glad to print the replies whether you agree or not.

A FEW QUESTIONS FOR A STARTER.

Presumably in this department we could ask questions which would end up in a scolding match. We aim to avoid anything of the kind. We are trying to get at facts; at the very truth of the matter. When the truth is known there is nothing to explain anyway. So when we ask the questions, as we do at various times, we want you to believe that we have the very best interests of all concerned at hand. We expect finally to arrive at the truth, but we are fully aware that it will take some time in traveling the road. In asking the following questions we assume that you will make the answers as fully to the point as you can and that you will not guess at anything.

1. A fellow said the other day, "I want, always, to work for the best interest of the employer." What is your opinion of this matter? How do you think you'd go to work to show the boss that those were your sentiments?

2. Did you ever, up to date, secure an extra contract for your employer, and, if so, did he return the favor? Did it pay you to spend the extra time that it took to get the job?

3. How many weeks' work each year do you succeed in "getting in?"

4. How do you pass away the time that you are idle?

5. We remarked that we failed to see that there had been any great improvement in workmanship in the past 25 years. We should like to be corrected in this, if we are wrong. Perhaps you can show us. We are quite willing for you to do it.

That's enough for this time. We will lay down our pen and look for the answers that you'll send to us.

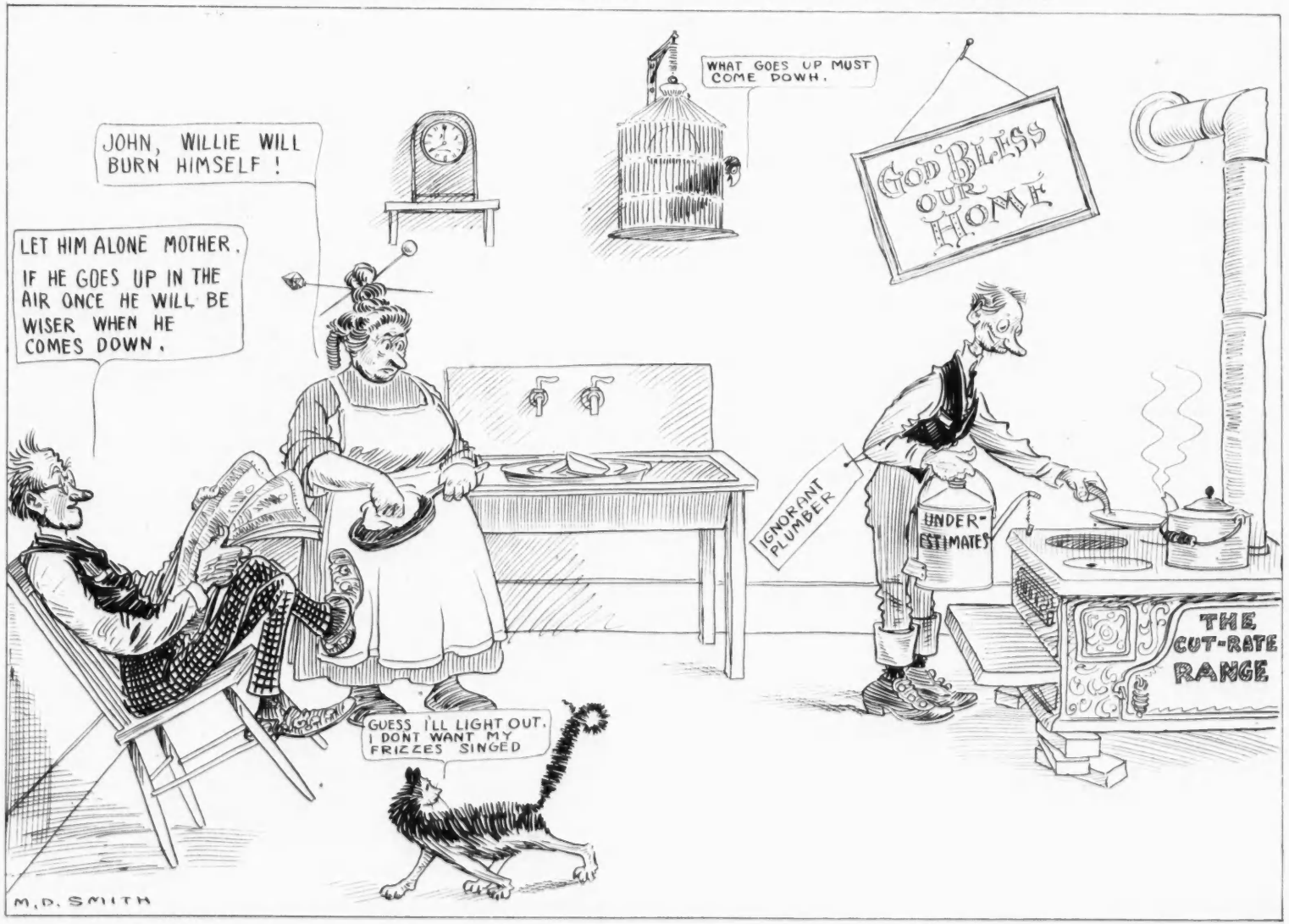
A Sly Suggestion.

They had reached the outer portals of the front door, and were there going through the process of parting, very lingeringly.

"When I say good night to you this evening," gurgled Mr. Youngslow, "do you think it would be proper for me to place one reverent kiss on your fair hand?"

"Well," she sighed, softly, as she laid her head quietly on his shoulder. "I should consider it decidedly out of place!"—Lippincott's.

"Domestic Engineering's" Cartoon on the "Dangers of Under-Estimating."


JOHN, WILLIE WILL BURN HIMSELF !
LET HIM ALONE MOTHER. IF HE GOES UP IN THE AIR ONCE HE WILL BE WISER WHEN HE COMES DOWN.
WHAT GOES UP MUST COME DOWN.
GOD BLESS OUR HOME
IGNORANT PLUMBER
UNDER-ESTIMATES
THE CUT-RATE RANGE
GUESS I'LL LIGHT OUT. I DONT WANT MY FRIZZES SINGED
M.D. SMITH

Even the Cat Got Wise!

A PLUMBER'S DIARY

BY PHOENIX

XII.

Sept. 1.—Well, here I am in one of the finest little cities of the great farming state of Iowa. This town is certainly a bird. Makes you get up and get an extra wiggle on as you pass along the street from the very spirit of enterprise which seems to rather jump through the air.

I got here in good style, too. First-class passage and the blamed telescope checked in the baggage car. The party I came here to work for appeared mighty glad to see me. Came right out and shook hands with "yours truly" and fell all over himself in trying to make me feel at home, and seemed to be trying to make me one of the family.

It was an entirely new one on me and I could not figure it out. The thing didn't look logical. I had never been used to such a line of treatment and he had me guessing all right. I didn't own any stock in the company, I wasn't any great notable, hence, why this great palaver? It looked shady on the face of it, and I said to myself, "Old boy, look out for the gold-brick." But I let on to him that I was mighty tickled with the western hospitality and let it go at that, apparently.

I got into the city after an all night's ride and had showed up at the shop the first thing in the morning. So after the first greetings were over (and done for, for all time), I remarked that I had better go out and look up a room and get located. "No use of that," he answered. "I am going to send you up in the country a couple of hundred miles to put in a hot-water job. Just go to the hotel for the day, and I will pay the bill."

It fairly got on my nerves. No use talking, I was not used to such treatment, and I couldn't figure out what he was fishing for. Another thing that worried me was that when I went back to the shop to see about packing up the tools for the job, he told me that they had all gone forward and the goods and all the pipe and the fittings as well.

Said he, "You just loaf around town to-day and show up at the depot at half past seven this evening and we will take the train for the place. I am going to go up there with you for one day and give you a lift. I'll also have one of the helpers of the shop go along."

I never saw a prettier and more home-like city than was that little western city. Great green lawns in front of the houses, good-sized shade trees and a fine street-car service. It fairly made one glad to live and I would have been glad to have had a chance to stay in the place for a time just to get acquainted. I never yet had been in a place where the first impressions were so promising, but they did not hold out; it was too rich for this earth. Wait until you see the finish. Any one who is hard up for time can jump from this place direct to the moral (which will appear at the close of the article).

We were all at the depot on time and soon on our way for the job "up country." When we got seats in the smoker the boss began to unload history and events on me. It appeared that there never yet was a better man in the world with the tools than he was. He could cut up "slathers" of two and three-inch pipe alone in a day. He had a way of putting in the hot-water mains that would make the radiators trot at a mile-a-minute gait to deliver the goods and he could just nail contracts until you couldn't carry them around in your pocket for the load of them. And so on for hour after hour did I have to take the stream of this man's life talk.

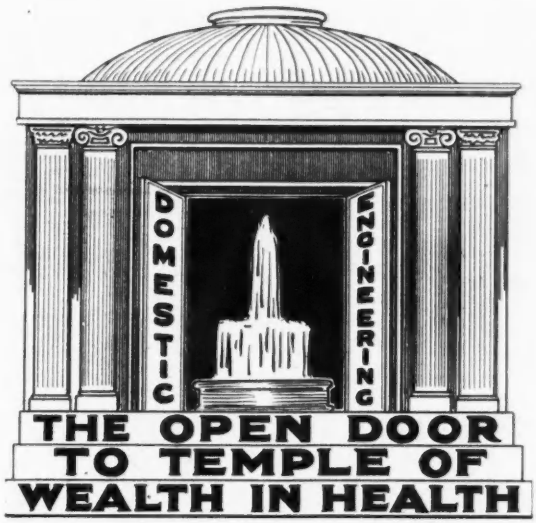
"Good God," said I to myself, "he's chesty, that's it. Now I know that I am up against it, for it's me with the uncertain temper." About midnight we arrived at our town and put up at the hotel. About 5:30 the next morning old "chesty" uncoiled himself and began to get in action. He got us up and fed in less than 45 minutes and then he headed for the freight-house to see about the goods. Nothing doing, as it would not be open until about eight o'clock, we found out. Then he chases up to the place where we were going to put in the job and they had not yet got up. So there we were and nothing doing, and the boss sweating on the job the first thing.

After a while things broke better and the clouds began to pass away. We got the goods on the job, the bench set up and tackled the boiler, which we had set up before night. The old man certainly could hustle some, and don't you doubt it either. That night he decided to stay another day with us. The next day he unfolded the manner of piping the house to me.

The first floor radiators all went on one set of mains, while the second floor had an entirely separate set of mains to itself. It made the deuce of a lot of pipes in the cellar and was a whole lot more work. A man had to be a regular "motor" to make any time on the job at all.

Added to this we had to cut in an extra hole for a supply in one of the sections, as the boiler did not have enough to run the mains the way he desired. The pipes for the second story had to be run behind the partitions and the house had been built for several years. No wonder he wanted to see the job started.

To make a long story short I stuck to the job until it was all done and then fired it up. The blamed boiler leaked like a riddle. I "cinched" it up tighter, but it was no go. You could not make it hold anyway. The push-nipples were a shade too small. I "wired" the boss and he came up post-haste with some different nipples and he was about the maddest man I ever saw. He fairly flew at that boiler and yanked it to pieces and then slammed it together in short time on the new nipples and "cinched" it down, using the largest wrench on the job for the purpose. Then he fired up. Filled the boiler half full and built a wood fire. It was not long until there rang out three loud snaps and three of the sections of the boiler had cracked. The story ends here. We parted. It was a case of misdirected energy. This man worked hard, but he had no head for business. What's the use of killing yourself with work and getting nothing for it? Energy, wrongly applied, and worry break men and kill at last.



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Change of address.—The old address should be given as well as the new, and notice should be received a week in advance of the desired change.

NOTICE TO ADVERTISERS.

Copy and cuts for advertisements intended for a particular issue should reach the office of Domestic Engineering on Monday of the previous week if it is desired that a proof of the advertisement shall be submitted. New advertisements can be received up to noon of Monday of the week of issue, but no proof can be shown.

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SPECIAL NOTICE TO READERS.

Our readers are invited to send in articles on any topics covering sanitary interests as outlined above. Photographs and drawings with descriptions of special interest to plumbers and steam-fitters are welcomed. "Domestic Engineering" pays at space rates for all articles, notes, criticisms and news data so contributed.

Among the Wholesalers

REPUBLIC MFG. CO. LEASES ADJACENT BUILDING.

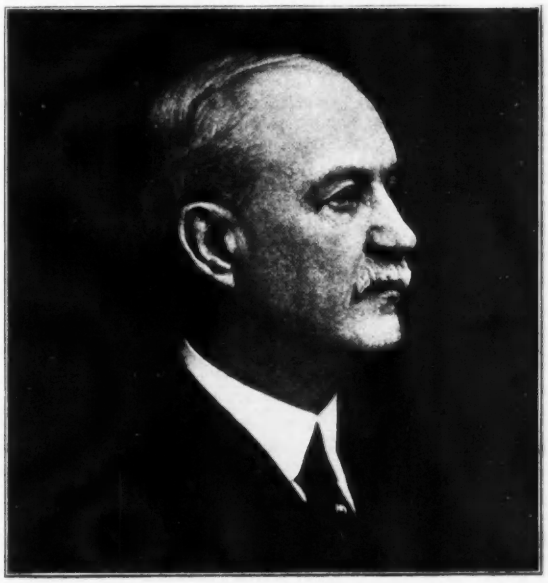
The Republic Mfg. Co., Chicago, has leased a five-story building, 42 x 88 ft., with basement, adjoining the building which the company now occupies at 656-658 Washington St. The first floor of the new building will be occupied by their offices, while an elaborate show-room will be arranged on the first floor of the concern's present quarters.

THE CELLUVARNO CO. SECURES A NICE CONTRACT.

The Celluvarno Co., 44 East Kinney St., Newark, N. J., has secured the contract for furnishing about 350 bathrooms in the new Ritz-Carlton hotel, 46th street and Madison avenue, New York, with Celluvarno closet-seats, mirrors, grab-rails and towel-bars. The Ritz-Carlton hotel is being erected by the Goelet Estate and when completed will in all probability be one of the most exclusive hotels in the United States.

LUCIUS A. COLE, PRESIDENT OF THE NATIONAL LEAD CO., DIES AT CARLSBAD.

Lucius A. Cole, president of the National Lead Co., New York City, died of heart failure on Thursday, August 25, at Carlsbad, Austria, where he had been staying for several weeks in the hope of regaining his health. Mr. Cole was born at Columbus, O., May 25, 1847, the



The Late Lucius A. Cole.

son of George and Elvira Moore Cole. While still a boy his family removed to Cincinnati, where he passed his youth and early manhood, beginning his business career at the age of 14 as clerk in a wholesale dry goods establishment. At the age of 17 he enlisted with the Union forces and served two years, until the end of the war, on a gunboat on the lower Mississippi. In 1872 he married Emma Straub, daughter of Isaac Straub, of Cincinnati, who survives him. Shortly after his marriage he removed to Parkersburg, W. Va., entering the service of the Camden Consolidated Oil Company, of which he later become vice-president. In 1890 Mr. Cole accepted

the position of secretary of the National Lead Trust, and removed with his family to East Orange, N. J., where he resided until within a few months of his death. When the National Lead Company was organized in 1891 he became its treasurer, and in 1892 one of its vice-presidents. Upon the death of the late Colonel William Payne Thompson in 1896 Mr. Cole was elected to succeed him as president of the company and continued in that office up to the time of his death. In addition to his office as president and a director of the National Lead Company, Mr. Cole was a director of the Seaboard National bank, the New Amsterdam Casualty Company and Assurance Company of America, all of New York City, and president of the St. Louis Smelting & Refining Company, of St. Louis. He was also a member of the New York Chamber of Commerce, of the Down-Town Association, and of the Lawyers' Club.

PERSONAL MENTION.

W. R. Marshall, general sales-manager of the Universal Sanitary Mfg. Co., New Castle, Pa., was in Chicago this week and called on some of his many friends in the trade.

Fred W. Zander, of the Zander Plumbing Supply Co., which recently started in business on Broadway in Buffalo, N. Y., has just been elected president of the Broadway Business Men's Association in that city.

B. Thos. Beardsley, manager of the manufacturing department of the Allyne Brass Foundry Co., Detroit, Mich., was in Chicago last week visiting the trade.

Geo. H. Bailey, of the Bailey-Farrell Mfg. Co., Pittsburgh; J. L. Sullwold, of the Western Supply Co., St. Paul, and Frank Wheelock, of the Riverside Potteries Co., Wheeling, W. Va., visited the Chicago trade this week.

Ralph Hughes has again joined the selling force of the Pittsburgh Sanitary Mfg. Co., Pittsburgh.

HE DELIVERED THE GOODS.

B. Muhlhauser, advertising manager for the Kewanee Water Supply Co., Kewanee, Ill. has returned from his two weeks' vacation, which he spent at the lakes in Wisconsin. As was predicted by "Domestic Engineering," when he started out on his fishing trip, he has no tales to tell about the large

He did it with his Little Hatchet.

fish that got away from him, as is evidenced by the accompanying illustration. He says, "My line and patent hook failed in the pinch, but by a little rough-riding and with my trusty hatchet I got the big one." Notwithstanding the fact that he says "my hatchet," it looks suspiciously like the one Carrie Nation left behind her last year.

THE XXTH CENTURY SHEET-METAL WORKER.

"The American Artisan," Chicago, has just issued a useful book for the metal worker, entitled "The XXth Century Sheet-Metal Worker." This is a modern treatise on modern sheet-metal work, by H. E. Osborne, and is full of useful hints and information on ordinary and special lines of metal-working practice. The book contains 86 pages and is copiously illustrated. It can be obtained by addressing the "American Artisan," Chicago. Price, $1.00, cloth-bound; 60 cents, flexible cover.

AN ATTRACTIVE CALENDAR.

We have once before called attention to the attractive calendar which was recently gotten out by the Pfau Mfg. Co., Cincinnati, O. The illustration on this calendar is so attractive that we are unable to resist the temptation

The Attractive Illustration on the New Calendar of the Pfau Mfg. Co., Cincinnati, O.

of reproducing it herewith en miniature. The calendar is 16x25 in., and it will prove a suitable ornament for any plumber's office.

KING'S PIPE-JOINT COMPOUND.

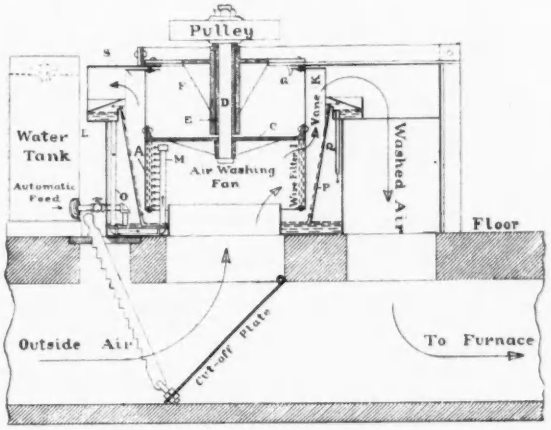
Walter E. King, Cincinnati, O., is calling attention to his pipe-joint compound by an 8-page folder setting forth special points of merit of his product. This pipe-joint paste is for use on screw-joints in joining together radiators, gas-fixtures, and boilers and for all water, steam, gases, air-oil and all iron fittings. It is claimed that it is adhesive and endurable, does not get hard or dry in the package and when applied forms permanent protective and air-proof tissues between the threads, preventing leaks, corrosion and rust. Further details can be obtained from Mr. King upon application at his headquarters, 208 W. 3rd St., Cincinnati, O.

SIX LITTLE POINTERS.

"Six Little Pointers" is the title of an attractive little leaflet issued to the trade by the Arlington Mfg. Co., Canton, O. It describes six meritorious features of the Arlington pipe-joint compound, which is used for steam, gas, water, compressed-air and other connections. The special merits claimed for this compound are that it does not cake or harden, but remains plastic indefinitely; it is proof against the action of heat and acids, and allows the unscrewing of pipe-joints with ease whether they be old or new. J. Leadbeater, who has been instructor of the plumbing class in the Milwaukee trade school for the past four and one-half years, has been appointed agent of the Arlington Mfg. Co. in the district comprising Chicago, Elgin, Milwaukee, Joliet, Gary, and Aurora. His office is at 1314 Hartford Bldg., Dearborn St., Chicago. Mr. Leadbeater will be glad to furnish special information concerning the Arlington products upon request. Copies of the leaflet can be obtained from Mr. Leadbeater or from the Canton office.

THE ZELLWEGER AIR-WASHING AND COOLING FAN.

Air-washing and cooling are topics of increasing importance, and many are the devices that are being placed on the market to supply the demand for clean air and proper temperature. One of the interesting forms is that introduced by J. Zellweger & Sons, 1900 Adelie Ave., St. Louis, Mo., an extensive illustrated description of which is furnished in their recent catalog. Air-purification is accomplished by the dry or the wet methods. In the

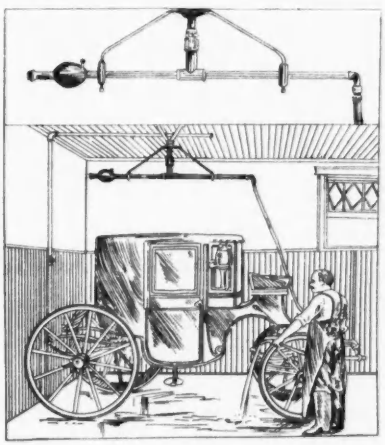


The Zellweger Air-Washing and Cooling Fan Installed.

latter, water is used to remove dust from the air by adhesion, to abstract vapors from the air by condensation and solution, and to absorb some of the gases. The Zellweger Air-washer consists of a filter wheel, a sprinkling device and the housing. An interesting portion of the catalog is that devoted to indirect heating. The illustration shows a general plan of one of these installations. A copy of the catalog can be obtained upon application to J. Zellweger & Sons.

FOREMAN'S SWINGING HOSE-BRACKET.

One of many plumbers' opportunities to enlarge his business-hold on the community in which he resides is offered by the L. T. Foreman Swinging Hose-Bracket Co., Omaha, Neb. As the name indicates the hose-

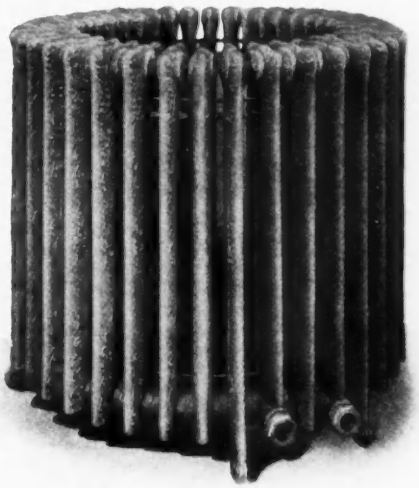


The Foreman Swinging Hose-Bracket.

bracket swings, and by so doing gives a wide circle of control. This range should commend itself to the user for it saves hose, pipe-fittings and valves. These brackets can be swung in any size, length or shape to suit all local garage, livery-stable or factory conditions. For instance, in the case of a round-house, the brackets can be swung to cover four tracks, and thus save the trailing in the mud of from $75 to $100 worth of expensive rubber hose by two or three men. With the Foreman device, one man can do the work easily. With a 15-ft. swing, a boiler-frontage of from 50 to 60 ft. can be controlled. The hardware-people do not want to handle the bracket because it would cut into the rubber-hose trade, but the plumber, with no such objection in mind, should be able to develop business for Foreman goods among his customers. Further information and quotations can be obtained upon request to the Foreman company at Omaha.

AN ATTRACTIVE RADIATOR AND BOILER CATALOG.

The Cameron, Schroth, Cameron Co., East Michigan and Rush streets, Chicago, has just issued an exceedingly attractive catalog illustrating and describing "Richmond" boilers and radiators. The section devoted to radiators is particularly instructive and interesting, containing, as it



The "Richmond" Column Radiator.

does, illustrations and descriptions of all types of radiators—direct, direct-indirect, and indirect—in all sizes and for all purposes. As a sample of the illustrations we take pleasure in reproducing herewith the "Richmond" column radiator, one of their many special patterns suitable for the encircling of a column or a pillar in store or hall. The book is printed in two colors on high-grade paper, 8x10 in., 80 pages, and as it is a very expensive sample of the printer's art, it cannot be distributed indiscriminately, but members of the trade who can make use of it in their business can obtain a copy of it upon application, mentioning "Domestic Engineering."

John Levanetz has purchased A. Dummer's plumbing business in Two Rivers, Wis.

Herbert Robinson has purchased Henry Horn's plumbing business at North Manchester, Ind.

Fred Domeyer has opened a plumbing establishment in the Gilbreath building at Mandan, N. D.

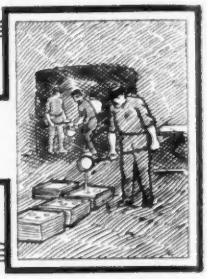
At Youngstown, O., efforts are being made to erect public-comfort stations in the South Side and Lincoln parks in that city.

The Johnstown Heating and Pipefitting Co., Johnstown, Pa., has secured the contract for the heating of the new addition to the high-school building in that city.

The Orchard Heating Co., Los Angeles, Cal., has been incorporated with a capital of $21,000. The incorporators are: Harry A. Sane, Fred H. Hammer and Mabel R. Sane.

Tate & Kapus, Winterset, Ia., have secured the contract for plumbing and heating E. C. Moorman's residence and J. G. Schriver's bungalow in that town. This firm will also remodel the heating system in the First National Bank block.

THE METAL MARKET



PIG IRON MORE ACTIVE.

Bargain hunters have purchased pig iron in the Pittsburg market, where there has been quite a little activity. There have been inquiries for 30,000 to 40,000 tons of Bessemer and basic iron. Several sales have also been consummated in Chicago and Cincinnati. Reports are to the effect that several interests made inquiries in the market for 1,000 to 3,000 tons of material in the East, but very few of these have been turned into orders. In the Western market foundry-iron business has been very quiet and prices are practically without change from last week, as follows:

No. 2 Southern foundry, Birmingham	$11.00	to	$11.50
No. 1 Northern foundry, New York	16.00	to	16.25
No. 2 X Northern foundry, New York	15.50	to	16.00
No. 2 Plain Northern foundry, New York	15.25	to	15.50
No. 2 Northern foundry, Chicago	16.50	to	17.00

COPPER MARKET STAGNANT.

A leading seller of Lake copper has offered Lake at 12.87½ cents, but all other producers refuse to sell at less than 13 cents. Electrolytic is held at 12.62½ cents in the New York market. According to current report, production has been reduced as much as 15 per cent. This is doubtful. However, if the producers of copper have been able to agree together to reduce production as much as 10 per cent, they have done well, and should they continue such a process the addition to the surplus month by month will cease. In Europe consumption is good, but in America there is a slight falling off. It is expected that this falling off will continue, but it is extremely doubtful if it will be in the same proportion as the falling off in the consumption of pig iron. The exports have been larger, and it is possible that the European manufacturers are endeavoring to replenish their invisible supplies.

TIN PRICES SHARPLY ADVANCE.

It is evident that the shortage of tin that has been becoming more and more pronounced ever since the 1st of June is reaching an acute stage. Prices this week advanced nearly 2 cents a pound, and in spite of the sharp up-turn in prices consumers purchased freely. The advance in New York was the result of higher quotations in London, so that it can be attributed to the shortage of tin. A reason which leads to the belief that higher prices are likely to rule for some time to come is the fact that there is only a difference of ¼ cent per pound in the price for spot delivery and for delivery three months hence. Tin is the only metal that is now being produced at a less rate than is being consumed, which leads to the question: What would be the effect on the tin market should there be any special activity in business generally? Tin in 5-ton lots is now selling at 36 to 36½ cents.

LEAD.

Prices are without change. The leading interest is selling lead at 4.40 cents in New York, and outside sellers are asking 4.45 cents for prompt shipment.

SPELTER.

Some of the largest consuming interests have been purchasing spelter freely in the last 10 days, and in consequence the market has advanced rapidly. Spelter, which was selling at 5 cents in St. Louis, is now quoted at 5.20 cents in that market, and in New York 5.35 cents is quoted. Some of the producers are prepared to close down should the price recede as low as 5 cents.

OLD IRON.

Some activity is noted in the demand for cast scrap and inquiries for other kinds of material are coming in rather more freely. Some sales have been made at the following quotations, which are per gross ton for delivery in New York:

No. 1 yard wrought long	$12.00	to	$12.50
No. 1 yard wrought short	11.50	to	12.00
Machinery cast	11.50	to	12.00
Wrought pipes and tubes	11.50	to	12.00
Wrought turnings	7.00	to	7.50
Cast borings	6.50	to	7.00
Stove plate	9.00	to	9.50

CONTRACTS AWARDED.

E. P. Sumpter Plumbing & Heating Co., Bowling Green, Ky., has secured the contract for the installation of a hot-water heating system and an acetylene gas light system in H. S. McCutcheon's handsome residence near South Union. This company has plumbing contracts in Glasgow, Franklin, Russellville and Smith's Grove at the present time.

G. F. Bohne, Mount Pleasant, Utah, has been awarded the contract for the installation of an up-to-date plumbing system in the city-hall and jail in that city.

The Northern Plumbing & Heating Co., Eveleth, Minn., has been awarded the contract for the plumbing and heating of the new high-school building at Gilbert, Minn.

Leslie, Elliott & Co., Paterson, N. J., has been awarded the contract to install two heating boilers at the General hospital in that city. The contract amounts to $2,300.

The contract for the plumbing, heating and gas fitting for the St. Clair Hospital to be erected in the East End of Columbus, O., has been awarded to Joseph Dolan in that city, who also has secured the contract for the plumbing work in the Knights of Columbus temple, to be erected at Sixth and State streets, Columbus.

Fosdick & Greenway, Forth Worth, Tex., have been awarded the contract for plumbing the West Texas State Normal College building. Consideration $7,500.

E. Eichberg, Petersburg, Va., has been awarded the contract for the installation of an up-to-date plumbing system in the executive mansion at Richmond, Va. The contract calls for the very finest work and material.

Johnson, Rowe, Paige & Co., Omaha, Neb., has secured the contract for installing closets in the Central School building at Newton, Ia. The contract amounts to $4,340.

A. White, Red Bank, N. J., has secured the contract for plumbing in seven new houses owned by Wm. E. Lloyd at Freehold, N. J.

The Bay City Plumbing & Heating Co., Bay City, Mich., has been awarded the contract for the plumbing of the Polish convent at Salzburg, Mich.

Game Talk.

A baseball enthusiast took his wife to the ball game, says an exchange. That night the "fan" was awakened from his slumber by his better half shouting in her dreams "Kill the umpire!" "Kill the umpire!" Half asleep, he sprang out of bed, and in doing so he knocked over the washstand. The crash awoke Mrs. "Fan." "Did you kill the umpire, John?" she inquired.

"No," replied John, angrily. "But I smashed the pitcher."

"Don't you think it foolish for a country no richer than Brazil to buy a $14,500,000 battleship?

"I'm not in a position to be critical. Fact is, I just bought an automobile myself."

CHICAGO NORTH AND NORTHWEST SIDE MASTER PLUMBERS' ANNUAL PICNIC.

The Chicago North and Northwest Side Master Plumbers' Pleasure Club held its seventh annual outing and basket picnic on Saturday, August 27th, and following its well-established custom the affair was again this year held "far from the maddening crowd" in Schiller's Grove on the Desplaines river, near Kolze, Ill.

It was an ideal day for an outing, and so eager were the members of the club to "make a day of it" that quite a number of them reached the grove early in the fore-

The Main-Stays of the Picnic.

The Coming Fillers of Future Picnic-Baskets.

noon. By noon most of the participants had arrived either by automobile, buggy or surrey, and it did not take very long before the entire party arrived at the conclusion that it would be only right and proper to give the lunch-baskets a thorough examination. The entire party split up in a number of smaller parties which around the many tables under the shade-trees in the grove enjoyed the excellent viands the thoughtful plumbers' wives had prepared for the festive occasion.

Dinner over, visiting was in order and a social hour was enjoyed by most of the picnickers, now and then interrupted by greeting some new late arrival. A few, however, could not resist the enticing band, and sought the dancing pavilion where they enjoyed this pleasant pastime.

In this way the time sped on until about 3 o'clock, when the great event of the day was called, the baseball game between the Northwest-Side Master Plumbers and the North-Side Master Plumbers. The line-up was as follows:

Northwest Side.	Position.	North Side
E. C. Wagner	pitcher	William Gawne
Paul Jacoby	catcher	Wm. F. Bahn
Frank E. Pearson	1 b.	A. W. Bahn
W. H. Hayes	2 b.	Wm. F. J. Lutz
Chas. Madeen	3 b.	A. C. Peterson
Peter Feltman	l. f.	L. A. Clausen
Luke Keefe	c. f.	H. O. Ammeson
J. Cepican	r. f.	Chr. Wolf
A. Schueller	s. s.	Peter M. Munn

Umpire, Paul Redieske.

The game was exceedingly interesting and full of brilliant playing particularly on the part of the Northwest Siders who won with a score of 19 to 7.

Both before and during the game as well as after it was all over, "Domestic Engineering's" camera was kept busy as the accompaning illustrations show.

Around 6 o'clock the lunch-baskets were again subjected to another attack, after which the lengthening shadows gave warning of the approach of the night. This was taken as the signal for the homeward journey. The automobiles, buggies and surreys were then given due

A Sun-Setting Snap of the Plumber-Baseball Enthusiasts.

attention and just as the sun went down the long caravan was started on its journey to Chicago.

The day had been perfect and every one in attendance had enjoyed a season of unalloyed pleasure not a single incident having occurred to mar the pleasure of any one of the 200 picnickers.

Among those who were there with their famlies and whose names have not already been mentioned were:

The Best Crop this Year. All Daisies and Peaches.

Chas. C. Breyer, Henry Breyer, Jacob G. Weber, Fred J. Wagner, Geo. Franklin, C. H. Jespersen, Marcus Weil, W. G. Wood, and Peter M. Munn, all of Chicago. Among out-of-town visitors, who graced the event with their presence, we met Harry Snow, of the Peerless Selling Co., Evansville, Ind.

The fat man's race was won by Fred Armstrong, city plumbing inspector, for which he received first prize. G. A. Woods came very near winning, but a collision with Harry Schurer nearly knocked him out.

The ladies' foot race was won by Miss Etta Gibson, who made exceptionally good time.

The ladies' egg race was won by Miss Mary Ryan.

In the jumping contest Ed Brechtel outdistanced his competitors and jumped 10 ft.

The sack race was won by Mark Costello of the Sanitary Plumbing Company.

The jumping sack race was won by Johnnie Rhodes, of the Sanitary Plumbing Company.

The master plumbers' foot race was won by Tom Reynolds, of Connelly & Reynolds.

The journeyman's race was won by A. Freeman, of the Sanitary Plumbing Company.

The running jump was won by R. Carpenter, of the Sanitary Plumbing Company.

The helpers' foot race was won by Arthur Helmer.

The small boys' egg race was won by Jack Cooper.

The small girls' race was won by Miss Vernice Dignan.

Tom Armstrong won the swimming contest.

The pie eating contest was very interesting and was won by George Davis, of the Standard Plumbing Company.

The outing proved such a pleasant affair that it is planned to make it an annual event in the future. The last one was held 17 years ago.

AUSTIN AND OAK PARK PLUMBERS TO ORGANIZE.

The master plumbers of Oak Park and Austin, Ill., are organizing a club which will be known as the Austin and Oak Park Master Plumbers' Pleasure Club. The new organization plans to give several interesting entertainments during the coming winter months.

Herr Lutz and Frau and all the Little Lutzes. Mrs. Keefe Standing and Holding Forth.

A moment of intense excitement. The ball is lost under an automobile and home runs are all canned.

Pitcher Wagner delivering his famous Cubanola-glide revented underhand ball. The score told how it worked.

PLUMBERS OF SPRINGFIELD, MO., HOLD ANNUAL OUTING.

The Master Plumbers' Association, of Springfield, Mo., held its annual outing Saturday, August 20th, at Terrel Springs on the Missouri Pacific, southwest of Springfield. The master plumbers chartered a special car for the occasion and invited as their guests the journeyman plumbers and helpers with their families. The committee in charge of the event were: Tom Armstrong, Charles E. Cook, G. A. Wood and James J. Lawler, and to these gentlemen belongs the honor of conducting the most successful outing ever held by the plumbers in that city.

After an elaborate dinner the afternoon was given over to various sports, chief of which was a baseball game between the master plumbers and the journeymen. The score was 3 to 2 in favor of the journeymen. The game probably would have been won by the master plumbers had it not been for Tom Armstrong's muff of Mauley's hot liner in the last half of the ninth inning.

The second game was between the journeymen plumbers and the Cubs, and resulted in a victory for the Cubs, who were presented with a pair of pliers for each man by the H. Cooper Supply Co. These games were umpired by H. Cooper and Harry Carson. They were each provided with two masks so as to be well protected against wild pitches.

The winners in the many races and contests were as follows:

CONNECTICUT PLUMBERS' EXECUTIVE BOARD HOLDS IMPORTANT MEETING.

The executive board of the Master Plumbers' Association of Connecticut held a meeting in the Tontine hotel, New Haven, Conn., on August 25th at which a large amount of business was transacted and business of importance was acted upon. A very active campaign is on foot and the reports received from different parts of the state show a marked interest in this year's special work. A large number of new members were added to the roll at this meeting. Pending the report of committees the meeting was adjourned two weeks.

Rather Particular.

"When I order poultry from you again said the man who quarrels with his grocers, "I don't want you to send me any of those aeroplane chickens."

"What kind do you mean?"

"The sort that are all wings and machinery and no meat."—Washington Star.

Nothing Off for Good Behavior.

"How long a term does the vice-president serve, pa?"

"Four years, my son."

"Doesn't he get anything off for good behavior?"

PACIFIC COAST NEWS.

The success of a San Francisco firm in securing the plumbing contract for the Hotel Oakland, one of the largest buildings to be erected in the trans-bay city, is encouraging local plumbing contractors to figure on similar work to be done in the near future in the fine new City Hall to be erected at that place. Eastern architects are now here finishing the detailed plans and specifications and it will not be a great while before plumbers will have an opportunity of bidding on this work, as it is desired to rush work on the structure.

John G. Sutton, of the John G. Sutton Co., the plumbing and heating firm at San Francisco, is in the Northwest at the present time, but is expected home shortly. Work on his company's new warehouse and office building on Folsom street will be commenced at an early date.

Robert Dalziel Jr. Co., San Francisco, Cal., has secured the contract for fitting up the new boiler room at the Hospital for Children and Training School for Nurses on California street, near Maple. A heating plant will be installed in addition to a steam power plant, the entire work to cost $17,433.

The H. Williamson Co., San Francisco, has contracted to install the plumbing and heating systems in the new four-story structure to be erected by William Ashcroft at Sixth and Jessie streets. This work is to cost $4,100.

The Turner Co., San Francisco, Cal., has just contracted to install the steam-heating and hot-water plant in the apartment house being erected by John A. Miller at Bush and Powell streets, the contract price being $1,953.

Ira W. Coburn, a San Francisco contractor, has taken the plumbing contract, in conjunction with a number of other contracts, for the work on the building of the Odd Fellows' Hall Association of San Francisco at Market and Seventh streets.

Local pipe-dealers are bidding on a quantity of pipe and fixtures to be purchased by Crescent City for extending the mains for fire purposes.

The contract for installing the municipal water plant at Lodi, Cal., has been let to Williams & Belser, San Francisco, on their bid of $6,795.

The Dow Pump Works, Alameda, Cal., has installed a pumping plant to supply its factory buildings with fire-fighting facilities. Salt water will be used and the city of Alameda may join a network of pipes to the plant of the manufacturing company for fire-protection.

E. Morrow, a dealer in plumbing specialties at Santa Rosa, Cal., and H. W. Luceford, a pipe-manufacturer of Los Angeles, have been visiting San Francisco the last week.

The Western Pacific Railroad has commenced a regular freight and passenger service on its transcontinental line, and on August 22d the first regular train entered Oakland. Several of the plumbing concerns handling supplies have already received shipments of stock over the new line and comment on the fact that shipments have come from the East in record time.

Archie Ayers, a member of the Seattle Heating & Plumbing Co., Seattle, Wash., is home from the National Convention of Master Plumbers. He remained in the East for some time after the close of the convention and then visited Rock Springs, Wyo., where he was once in business.

G. S. Wilcox has located at Pasco, Wash., and is conducting a business under the name of the Columbia Hardware & Plumbing Co.

The National Plumbing Co., National City, Cal., has just moved to a new location at that place, where it is in better shape to conduct its growing business.

NEW ENGLAND NEWS.

Competitive bids for plumbing, heating and other work in connection with the new reformatory buildings to be erected at Cheshire, Conn., will be received at the office of the board of directors until noon September 9.

The contract for the construction of buildings to be used for public sanitaries and storage purposes on Broadway and Lincoln parks, Somerville, Mass., have been awarded to A. W. Berry of that city.

An explosion of gasoline in Fitzgerald's plumbing establishment at 1354 State St., Bridgeport, Conn., a few days ago resulted in a fire that did $200 damage.

J. M. Naugle, 1986 Massachusetts Ave., Cambridge, Mass., has the contract for plumbing and William H. Jellison, 1108 Massachusetts Ave., the contract for heaters for a suite of apartment houses which are to be erected at the junction of Oxford and Beacon streets, in that city. When completed the house will contain 23 modern suites, of which 14 are to be ready soon.

A contract for new heating apparatus at the North school house in the town of Marion, Mass., has been placed with F. B. Coggeshall, who was the lowest of several bidders.

The town of Brookline, Mass., will receive proposals for heating and ventilating an eight-room primary school house on Westbourne avenue until 8 o'clock p. m. Monday, September 12, at the office of the school board in the town hall.

The G. S. Blodgett Co., Burlington, Vt., has the contract for plumbing a house to be erected by F. C. Partridge at Proctor, Vt.

The plumbing contract for the new school building on East Main street, Millers, Mass., has been placed with Staples & Gould for $1,324. The other bidders were: Clark, Ellis & Sons, $1,495; Pratt Brothers, $1,662.78.

All of the bids for work in connection with the changes proposed in the sanitary arrangements in the Prospect street school at Naugatuck, Conn., with the exception of bids for mason work, has been rejected and new bids asked.

The town of Athol, Mass., has been asked to appropriate $1,600 for a new heating plant for the Main street grammar school building.

Contracts for the new public-comfort station to be placed in the basement of the Malden, Mass., city hall have been placed. W. S. Kaulback, Malden, has the plumbing contract, and Joseph Chapman, also of Malden, the steam heating.

Plans are being prepared for a heating and ventilating system for the Charlton City grammar school, Webster, Mass. The matter is in the hands of the Rev. Edgar W. Preble, chairman of the school board. O. S. Kendall & Son, Worcester, Mass., are the engineers.

Mayor John F. Fitzgerald, of Boston, has approved contracts with Laskey & McMurrer, under items 2 and 3, and with McLean & Cousins for items 4 and 5, for repairs to steam heating apparatus in the various school buildings of the city. The bids follow:

	Item 2.	Item 3.	Item 4.	Item 5.
Laskey & McMurrer..	$1,858.00	$1,750.00	$1,208.00	$925.00
McLean & Cousens...	1,999.00	1,813.00	1,182.00	888.00
F. W. Bemier & Co...	2,100.00	1,800.00	1,344.00	994.00
J. J. Hurley & Co....	2,194.00			
Ingalls & Kendricken.	2,275.00			
J. P. Dwyer.....	2,304.00	2,537.00	1,603.00	1,263.00

BUSINESS VENTURES.

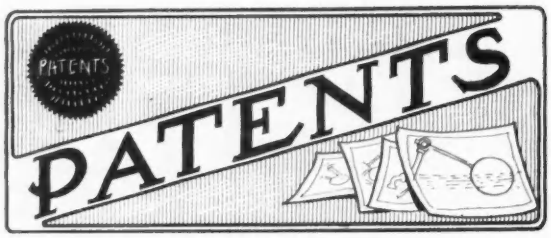
A. J. Schultz, formerly of Corning, Ia., is making arrangements to open a plumbing establishment at Huron, S. D.

Lawrence J. McNay and David S. Cowan have formed a partnership and opened a plumbing establishment at 63 S. Hawk St., Albany, N. Y.

The Vandergrift Steam Heating Co., Vandergrift, Pa., has been incorporated with a capital of $5,000. J. F. Horn is at the head of the enterprise.

The Foster Plumbing Co. has started in business at Shreveport, La. The officers of the company are: J. H. Anderson, president; J. W. Chamberlin, secretary.

Whitten Plumbing Co., Portland, Ore., has been incorporated with a capital of $5,000. The incorporators are A. L. Whitten, Harry W. Peterson and D. A. Hessemer.



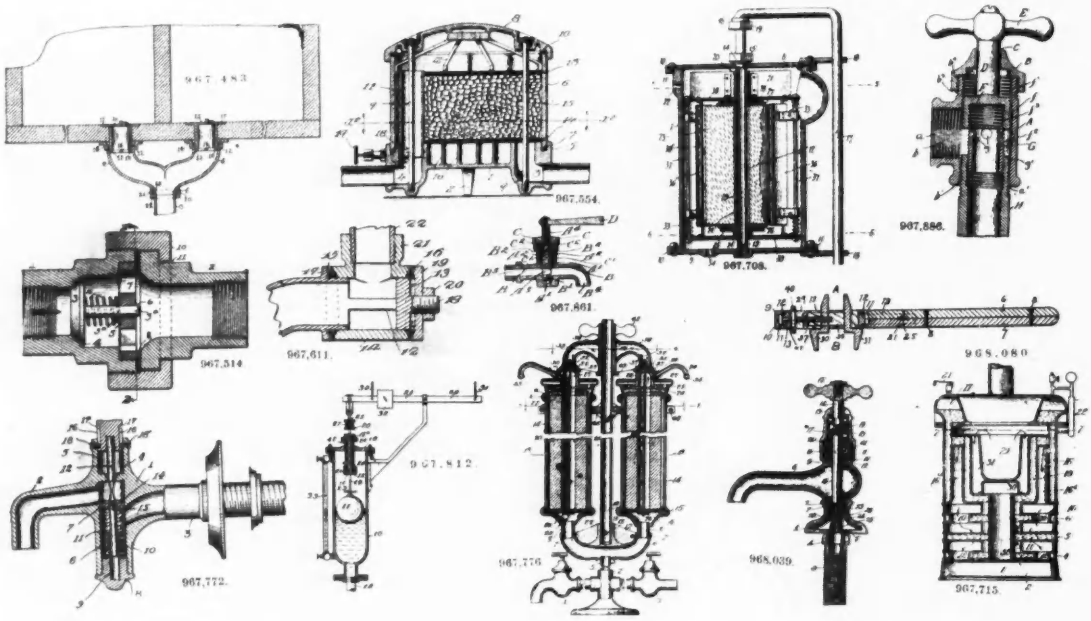
967,708. Water-Filter. Albert B. Bellis, Muskogee, Okla. A filter of the class described comprising a casing having an inlet in one side thereof, a perforated pipe located centrally within the casing, a discharge pipe communicating with one end of the perforated pipe, a porous cylinder arranged about the perforated pipe and having a central bore of greater diameter than the latter, disks at opposite ends of the cylinder resilient washers interposed between the ends of the cylinder and the said disks, a jam nut bearing against one of the disks spider frames bearing against the outer disk and said jam nuts, tie rods connecting the frames and spring controlled scraper blades carried by the tie rods and operating upon the cylinder.

each cylinder having a removable funnel-shaped top and a flanged in bottom; of an inverted bridge connecting the bottoms of the cylinders, adapted to support the cylinders; to conduct water from a supply service to the interior of the tanks support, means for holding filter stones in said cylinders under water pressure; a pair of filter stones insertible in the cylinders and having water-tight connections therewith, and means for conducting the filtered water from the stones, said means being connected with said bridge, whereby the stones are held in position in the cylinders.

967,812. Pressure-Regulating Apparatus. Thomas G. Mouat, Bratenahl, O. In an apparatus of the character set forth, the combination of a boiler and means for maintaining substantially constant the pressure of steam generated by said boiler, said means comprising a receptacle communicating with said boiler, a float in said receptacle, a sleeve adjustably mounted in said receptacle and provided with a valve seat, a rod connected with said float and extending through said sleeve, a valve carried by said rod and adapted to engage the seat carried by said sleeve, and a pressure regulating device connected to said rod.

967,450. Combined Mixer and Sprinkler. Zalmon G. Sholes, New York, N. Y., assignor to West Disinfecting Company, a corporation of New York.

967,483. Waste Connection for Washtubs. Thomas G.



967,715. Water-Heater. Achill Walter Brand, Boise Idaho. A boiler including in combination, a fire pot, means for directing a down draft on the fuel in said fire pot, a water chamber surrounding said fire pot, and extending underneath the same, flues leading down through said water chamber, a pipe connected with said flues at the base of the boiler, and extending up the side of said boiler, and a water chamber surrounding said pipe, and connected with the water chamber, around said fire pot.

967,772. Faucet. George R. Hohman, Rochester, N. Y. In a faucet comprising a hollow body having a nozzle and a shank in communication with the space thereof at different points, and having a partition dividing the space into upper and lower chambers, a plug closing the lower chamber and having a tubular guide at its upper end, a pressure-piece arranged to operate in the upper chamber, means for holding the pressure-piece when depressed, a stem connected with the pressure-piece and arranged to operate through said partition and within the guide of the plug, a piston connected with the stem for closing the passage through the faucet, and a spring located in the lower chamber and normally exerting an upward pressure upon the piston to hold the same in closed position.

967,776. Water-Filter. Charles F. Huber, Omaha, Neb. In a water filter, the combination with a pair of cylinders,

Andrews, Malden, Mass. The combination with trays having water outlet openings, of a fitting having branches of greater external diameter than said openings and provided with external and internal screw-threads and having a common outlet pipe section provided with external screw-threads, threaded strainer sleeves of a length greater than the thickness of the bottom of said trays to project through the outlet openings in the said trays and engage the internal screw-threads of said branches below the bottoms of said trays, and nuts engaging the external screw-threads of said branches, substantially as described.

967,514. Union Check-Valve. Harry H. Groh, Monocacy, Pa., assignor of one-half to James R. Kline, Monocacy, Pa. A union check-valve comprising two coupling members, a valve arranged within one of said members, said last mentioned coupling member being provided in one of its ends with a socket, a valve stem guide seated therein, the outer face of the said valve stem guide and corresponding face or edge of the said coupling member being flush and a packing ring arranged between said coupling members and overlapping said valve stem guide to hold the latter firmly seated in said socket.

967,554. Automatic Household-Filter. John Rarick, Upland, Cal. A filter comprising a filtering chamber, filtering means in one portion of the chamber forming an air space

in another portion, an outlet 4 communicating with said air space, an inlet 3 communicating with the filtering material, a flushing outlet 18 communicating with the chamber below the filtering material whereby the impurities which have been deposited therein by the pulsations within the chamber may be flushed therefrom through the flushing connection, and means forming a tortuous passage in the chamber below the filtering material between said inlet 3 and said flushing outlet 18.

967,611. Pipe-Joint. Wesley Christy, Globe, Ariz. A pipe coupling including a section of pipe having an annular flange adjacent its end with an inwardly beveled outer face and a pair of oppositely disposed ribs extending outwardly from the extremity of the pipe section, said pipe section also having a circular head upon the extremities of the ribs and a threaded stem projecting outwardly from the head, a sleeve disposed over the outer end of the pipe section and the head having inwardly beveled faces at its ends, a cap disposed in threaded relation over the stem and having an inwardly beveled inner face, and gaskets disposed against the ends of the sleeve beneath said flange and said cap, said cap being adapted to compress the gaskets between the ends of the sleeve and said cap.

967,861. Faucet. Charles A. Tilly, Brooklyn, N. Y. A faucet comprising a casing having inlet and outlet passages arranged in alignment and provided with an integrally formed tapering valve-seat extending across the passages at a point between them, a tubular neck extension disposed in line with the seat and having its bore adjacent the inlet and outlet passages tapered, a ported plug-valve having a tapering body adapted to tightly engage the wall provided by the tapering valve-seat and the tapering portion of the neck, a stem connected with the said tapered portion, a cap nut having a tubular member engaging in the said neck extension and also provided with a cylindrical flange arranged concentric around said tubular member and spaced therefrom for engaging the outside of the neck extension, the central tubular member of the cap nut having the lower portion of its bore tapered and adapted to bear upon the upper portion of the tapered valve to form a water-tight joint, and means for revolving the ported plug-valve.

967,886. Faucet or Cock. John Davis, Washington, D. C. In a cock of the character described, the combination of a casing, a cap therefor, a valve stem, a valve head carried by the stem, said head having screw threads on its outer and inner surfaces, the outer threads adapted to engage the casing, a nipple having a closed top, and openings below said top, and having screw threads to engage the inner screw-threads of the valve-head, the nipple and casing being threaded to engage a conduit.

968,039. Self-Closing Faucet. John P. Farley, Kansas City, Mo. A faucet comprising a spout, a tubular portion communicating with and depending from the base of the spout and forming at its lower end a downwardly-disposed valve-seat and provided above said tubular portion with an upwardly-projecting tubular portion communicating with the spout, a valve-stem extending through said tubular portion and said spout and provided at its lower end with a reduced threaded portion, a valve fitting upon said reduced portion and against the lower end of the nonreduced portion and adapted for seating against said valve-seat, a hollow base screwed upon the first-named tubular portion and depending therefrom and provided with an opening in its bottom and with a tubular stem depending from said bottom around the opening therein and of greater internal diameter than said opening, a nut fitting snugly and slidingly in the opening in the bottom of said base and screwed upon said reduced portion of the valve-stem for clamping the valve firmly against the lower end of the nonreduced portion of the stem, and provided externally with one or more channels through which water may pass from said tubular stem into the hollow base, a cap secured to the upwardly-projecting tubular portion of the spout, a packing ring surrounding the stem and embracing the same with a water-tight relation and provided with a depending portion closing communication between the base of the spout and said upwardly-projecting tubular portion, a nut mounted upon the upper end of the stem within the cap, a helical spring surrounding the stem and bearing at its opposite sides against said packing ring and said nut, and means movable in the cap for imposing downward pressure on the upper end of the stem to overcome the resistance of said spring and unseat said valve.

To The Trade:-

We are prepared to give you the utmost value in heating requirements.

Our boilers are the Capitol, Furman, Sun and Solar in both round and square.

In radiators we can furnish every height, kind or shape needed, either slip nipple or screw nipple construction.

Every specialty needed for a heating plant can be supplied by us.

United States Radiator Corporation

SUCCESSORS TO

United States Radiator Co.
United States Heater Co.
United States Radiator & Boiler Co.
Herendeen Mfg. Co.
Central Radiator & Foundry Co., Paola, Kansas
Heating Dept. of J. L. Mott Iron Works

Home Office---Dunkirk, N. Y.

Branches in Principal Cities

Classified Advertisements

Advertisements under this heading 4 cents per word per issue, address included. Remittance to be made with order. To insure insertion copy should be received not later than Wednesday morning.

Situations Wanted

WANTED—POSITION AS SALESMAN for good manufacturing company, by experienced man now employed, in heating, plumbing and supply business, acquainted with trade in Ohio and Kentucky; references. Address No. 398, "Domestic Engineering," Chicago.

POSITION WANTED—BY SOBER, INdustrious young man, experience in the heating business. Not afraid of work. Address No. 412, "Domestic Engineering," Chicago.

SUPERINTENDENT AND ESTIMATOR with 5 years of experience would like to correspond with heating and plumbing firms in need of such a man. Address No. 409, "Domestic Engineering," Chicago.

WANTED—WORK WITH A HEATING engineer or contractor by young man, age 21, technical graduate, can lay out and prepare plans, estimates, etc. Address No. 424, "Domestic Engineering" Chicago.

FIRST-CLASS AUDITOR SEEKS POSItion evenings checking up accounts or invoices; is an expert in plumbing line and familiar with new enamel-ware prices. Address No. 394, "Domestic Engineering," Chicago.

WANTED—POSITION BY YOUNG MAN who speaks both English and German fluently as bookkeeper and general office man with a plumbing or heating firm. Have had several years' experience in these lines. Address No. 415, "Domestic Engineering," Chicago, Ill.

Help Wanted.

WANTED—MANAGER TO TAKE ENtire charge of a concern manufacturing plumbers' cast-iron enamel ware. Address No. 391, "Domestic Engineering," Chicago.

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